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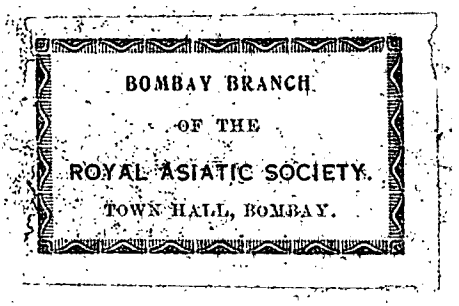

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TWENTIETH

ANNUAL REPORT

OF THE

INDIAN

CENTRAL COTTON COMMITTEE

FOR THE YEAR ENDED

31st AUGUST

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CONTENTS.

PAGE.

CHAPTER I.

1. Constitution and Objects 1
Agricultural Research Sub-Committee 2
Technological Research Sub-Committee 3
Wider Markets Sub-Committee 4
Cotton Forecast Sub-Committee 4
Cotton Ginning and Pressing Factories Sub-Committee 5
Research Students Selection Sub-Committee 5
Standards Sub-Committee 5
2. Administration 7
3. Meetings 8
4. Provincial Cotton Committees 10

CHAPTER II.

Cotton Statistics 11–22
1. Improvement in staple and yield 11
2. Demand for various types of Indian cotton 15
3. Stocks 15
4. Indian mill consumption 16
5. Exports 16
6. Statistics of cotton pressed 16
7. Unpressed (loose) cotton statistics 17
8. Statistics of cotton ginned 17
9. Indian cotton situation—1940-41 18
10. Collection of statistics of cotton imported into Bombay by road 19
11. Periodical reviews of the state of foreign trade in Indian cotton 20
12. Improvement of cotton forecasts 20
13. Report on the accuracy of the all India cotton forecasts 21
14. Publications 21

CHAPTER III.

Research 23–71
1. Fundamental Research 23
2. Research on Cotton Technology 27
3. Cotton Research in Provinces and States 28
(*i*) *Bombay.*—
(*a*) Broach Cotton Breeding Scheme 28
(*b*) Jalgaon Cotton Breeding Scheme 30
(*c*) Scheme for breeding wilt-resistant cottons in Surat area 31
(*d*) Scheme for improvement of Wagad cotton at Viramgam and Jagudan 32
(*e*) Scheme for inclusion of Northerns and Westerns cottons in programme of work of Dry Farming Scheme at Bijapur 33
(*f*) Scheme for interspecific hybridisation in cottons at Surat 34

		PAGE
(*ii*)	*Sind.*—	
	(*a*) Scheme for Cotton Jassid Investigation	35
	(*b*) Scheme for investigation into Black-headed Cricket in Sind	36
	(*c*) Scheme for production of long staple cottons in Sind	37
	(*d*) Scheme for bollworm investigation and clean-up campaign in Sind ..	38
(*iii*)	*Punjab.*—	
	(*a*) Punjab Botanical Scheme	40
	(*b*) Scheme for improvement of Punjab-American 289F/K.25 cotton ..	42
	(*c*) Physiological Scheme	43
	(*d*) Root Rot Scheme	46
	(*e*) Cotton Jassid Investigations in the Punjab	47
(*iv*)	*Central Provinces and Berar.*—	
	Central Provinces and Berar Cotton Breeding Scheme	48
(*v*)	*Madras.*—	
	(*a*) Pempheres Scheme	49
	(*b*) Scheme for improvement of Mungari cotton in Madras Province ..	50
	(*c*) Madras Nadam Cotton Breeding Scheme	52
	(*d*) Scheme for Improvement of Cocanadas Cotton in Madras Province ..	53
	(*e*) Scheme for investigating the possibilities of control of Cotton Stem Weevil of South India	54
(*vi*)	*United Provinces.*—	
	The United Provinces Botanical Scheme	56
(*vii*)	*Bengal.*—	
	(*a*) Comilla Cotton Scheme	57
	(*b*) Scheme for cultivation of long staple cotton in Bengal	58
(*viii*)	*Baluchistan.*—	
	Scheme for co-ordination of Black-headed Cricket in Sind and Baluchistan	58
(*ix*)	*Hyderabad.*—	
	(*a*) Botanical Research Scheme	59
	(*b*) Hyderabad Bollworm Clean-up Scheme	62
	(*c*) Scheme for inclusion of Northerns and Westerns Cottons in Programme of work of Dry Farming Scheme at Raichur	64
	(*d*) Scheme for improvement of Kumpta Cotton	65
(*x*)	*Baroda.*—	
	(*a*) Root Rot Scheme	67
	(*b*) Plant Puller Propaganda Scheme	67
	(*c*) Scheme for improvement of Mathio Cotton at Amreli	68
(*xi*)	*Bikaner.*—	
	Bengals Cotton Improvement Scheme	68
(*xii*)	*Mysore.*—	
	Mysore (Doddahathi) Cotton Scheme	70

PAGE

CHAPTER IV.

Seed Distribution and Extension Schemes— 72–87

1. *Bombay.*—

(*a*) Surat Seed Distribution Scheme 72
(*b*) Scheme for Control of Selection 1A cotton 73
(*c*) Jarila Seed Distribution and Extension Scheme 74
(*d*) Deccan Canals (Banilla) Seed Distribution Scheme 75
(*e*) B. D. 8 Seed Distribution Scheme 76
(*f*) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme .. 76
(*g*) Scheme for maintenance of nucleus of pure seed of improved varieties of cotton 77

2. *Sind.*—

(*a*) Sind Seed Distribution and Extension Scheme 79
(*b*) Scheme for maintenance of nucleus of pure seed of improved varieties of cotton 80
(*c*) Financing of Seed Distribution 80

3. *Central Provinces and Berar.*—

(*a*) Verum Seed Distribution and Marketing Scheme 80
(*b*) Scheme for Distribution and Marketing of Buri 107 cotton 81
(*c*) Maintenance of nucleus of pure seed of improved strains of cotton .. 82

4. *Madras.*—

(*a*) Madras Co.2 Seed Distribution Scheme 83
(*b*) Maintenance of nucleus of pure seed of improved varieties of cotton, Co.2, H. 1 and K.1. 83

5. *Hyderabad State.*—

Seed Distribution Scheme 84

6. *Baroda State.*—

(*a*) Baroda (Navsari) Seed Storage Scheme 85
(*b*) Baroda B. D. 8 Seed Distribution Scheme 86

7. *Schemes closed down* 87

CHAPTER V.

Progress in the Introduction of Improved Varieties of Cotton— 88–96

(*i*) Bombay 88
(*ii*) Sind 90
(*iii*) Punjab 91
(*iv*) Central Provinces and Berar 93
(*v*) Madras 93
(*vi*) United Provinces 95
(*vii*) Hyderabad State 95
(*viii*) Baroda State 96
(*ix*) Rajpipla State 96

CHAPTER VI.

PAGE.

General.— 97–108

1. Improvement in Marketing 97
2. Legislation 99
   (*i*) Cotton Transport Act 99
   (*ii*) Cotton Ginning and Pressing Factories Act 101
   (*iii*) Prevention of introduction of foreign cotton pests 104
   (*iv*) Madras Cotton Control Act 105
   (*v*) Bombay Cotton Control Act 105
   (*vi*) Central Provinces Cotton Control Act 106
   (*vii*) Baroda Cotton Control Act 106
   (*viii*) Bhopal Cotton Control Act 106
   (*ix*) United Provinces Cotton Pest Control Act 107
3. Research Students 107
4. Collection and supply of information 107
5. Publications 108

APPENDICES.

I. Members of the Committee 109

II. Balance Sheet as at 31st March, 1941; statement of receipts and payments for the year ended 31st March, 1941; statement showing expenditure on the schemes financed by the Committee up to 31st March, 1941 111

III. Receipts at mills in India of raw cotton classified by varieties .. 138

IV. Exports by sea of Indian raw cotton classified by varieties 142

V. Stocks of Indian raw cotton held in India by the mills and the trade on 31st August, 1940 and 1941 144

VI. Indian raw cotton consumed in Indian mills 153

VII. Revised trade classification of Indian cottons 155

VIII. Sind Cotton Ginning and Pressing Factories Rules, 1941, under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936 158

IX. List of scientific, technical and other officers paid from the Indian Central Cotton Committee's funds as on August 31st, 1941 .. 165

INDIAN CENTRAL COTTON COMMITTEE.
TWENTIETH ANNUAL REPORT.

CHAPTER I.

1. CONSTITUTION AND OBJECTS.

THE Indian Central Cotton Committee was constituted by the Government of India in the Department of Revenue and Agriculture, in their Resolution No. 404-22, dated the 31st March, 1921, as a result of the recommendation of the Indian Cotton Committee of 1917-18. At first, the Committee was purely an advisory body but, with its incorporation under the Indian Cotton Cess Act in 1923, it became an administrative body having at its disposal funds "for the improvement and development of the growing, marketing and manufacture of cotton in India." The funds of the Committee are derived from the cotton cess of two annas (four annas for the first three years) levied on every bale of Indian cotton either exported from British India or brought under process in a mill in British India. Including, as it does, representatives of growers, agricultural officers, traders, spinners and manufacturers, the Committee is an invaluable forum for the discussion of the many problems affecting the cotton industry. The ever-increasing understanding which has arisen from the association of leading commercial representatives with growers and research workers has led to developments of far-reaching consequence. Whilst the Committee's constitution ensures a broad outlook on the many problems which fall within its purview, its main concern is the interest and welfare of the cotton grower. The furtherance of this object, it should be mentioned, is greatly facilitated by the readiness with which trade associations, particularly the East India Cotton Association, take action on recommendations designed to benefit the cotton grower.

A list of the members constituting the Committee and the various interests they represent as on 31st August, 1941, is given in Appendix I. Under the

Indian Cotton Cess Rules, members, who are not *ex-officio* members, hold office for three years and one-third of their number retire each year in rotation. The term of office of additional members appointed by the Governor General in Council under Section 4(*xi*) of the Indian Cotton Cess Act is three years or such lesser period as may be specified in the notification of appointment.

Most of the detailed work of the Committee is carried on with the help of Sub-Committees, appointed annually, which hold office from the 1st April. This arrangement has proved very effective in practice as it not only enables the various schemes coming up for the consideration of the Committee to be thoroughly scrutinised and vetted but considerably lightens the task of that body at its half-yearly meetings when there is usually a very heavy agenda to be dealt with in a limited space of time. The functions of the various Sub-Committees and their composition as on 31st August, 1941, are given below :—

Agricultural Research Sub-Committee.—As its name implies, this Sub-Committee deals with matters pertaining to the agricultural schemes financed by the Committee. It reviews the progress reports on and programmes of work of the Committee's research, seed distribution and marketing schemes and makes such observations on them as it considers necessary for their future conduct. It examines proposals for new schemes and extensions of old ones. The progress of the work done by the Committee's research students also comes under its scrutiny. It assembles half-yearly, usually a day or two before the meetings of the Indian Central Cotton Committee. The constitution of this Sub-Committee was laid down at the 10th meeting of the Indian Central Cotton Committee and additions have been made from time to time ; the members during the year were :—

I. *The President*—Mr. P. M. Kharegat (*ex-officio*),

II. *The Vice-President*
III. *The Co-operative Banking Representative.* } Sir Chunilal V. Mehta (*ex-officio*),

IV. *Cotton Growers' Representatives.*—Sir William Roberts, Sardar Rao Bahadur Bhimbhai Ranchodji Naik, Mr. Roger Thomas, Rao Bahadur Sir Madhaorao Deshpande,

V. *Cotton Trade Representatives.*—Sir Purshotamdas Thakurdas, Mr. Chunilal B. Mehta, Mr. Chandulal P. Parikh, Mr. J. Vonesch, Mr. L. F. H. Goodwin, Dr. Chellaram Shewaram,

VI. *Agricultural Officers.*—The Agricultural Commissioner with the Government of India (*ex-officio*), Mr. H. R. Stewart, Mr. W. J. Jenkins, Mr. P. H. Rama Reddi, Mr. R. G. Allan, Rao Bahadur K. I. Thadani, Mr. Nizam-ud Din Hyder, Sardar D. K. Jadhav, Mr. Vishnu Sahay, Mr. J. C. McDougall, Mr. T. G. Rama Iyer, Rao Bahadur S. S. Salimath,

VII. *Additional Members.*—Dewan Bahadur Sir T. Vijayaraghavacharya, Mr. Mohammad Afzal, Mr. K. Ramiah, Rai Saheb Kalidas Sawhney, Professor R. H. Dastur, Rao Bahadur V. Ramanatha Ayyar, Dr. B. L. Sethi, Dr. R. Sankaran, Mr. S. S. Pande, Dr. V. G. Panse,

VIII. The Secretary.

Technological Research Sub-Committee.—This Sub-Committee deals with matters relating to Technological Research. It was originally constituted at the January 1924 meeting of the Committee with the object of advising the Director of the Technological Laboratory on technical matters. It meets a day or two in advance of the half-yearly meetings of the full Committee. The following were the members of this Sub-Committee during the year under report :—The President—Mr. P. M. Kharegat (*ex-officio*), The Vice-President —Sir Chunilal V. Mehta (*ex-officio*), The Agricultural Commissioner with the Government of India (*ex-officio*), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Mr. Chunilal B. Mehta, Sir William Roberts, Sir Shri Ram, Mr. H. R. Stewart, Mr. W. J. Jenkins, Mr. P. H. Rama Reddi, Mr. J. C. McDougall, Mr. Chandulal P. Parikh, Mr. L. F. H. Goodwin, Capt. S. R. Pocock, Mr. J. Vonesch, Rao Saheb P. V. Deshmukh, Mr. E. F. G. Gilmore, Dr. Nazir Ahmad, Rao Bahadur V. Ramanatha Ayyar, Rai Saheb Kalidas Sawhney, Mr. Y. G. Deshpande, Mr. K. Ramiah, Mr. Roger Thomas, Dr. R. Sankaran, Dr. B. L. Sethi, Mr. F. F. Bignell and Mr. A. D. Walwyn (Representing the Bombay Millowners' Association), Seth Himatlal Kalidas and Seth Chinubhai Chimanlal (Representing the Ahmedabad Millowners' Association), Mr. R. G. Saraiya and Mr. Gatulal

Rangildas (Representing the East India Cotton Association, Ltd.) and Mr. A. B. Kotak and Mr. Kisharam Lekhraj (Representing the Karachi Cotton Association, Ltd.). Two meetings of this Sub-Committee were held during the year under review.

Wider Markets Sub-Committee.—This Sub-Committee was constituted by the Committee at its meeting held in August 1933 for investigating the question of finding wider markets for Indian cotton. The members of this Sub-Committee during the year were :—The President (Mr. P. M. Kharegat), The Vice-President (Sir Chunilal V. Mehta), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Dr. W. Burns, Dr. T. E. Gregory, Mr. H. R. Stewart, Mr. W. J. Jenkins, Sir William Roberts, Mr. P. H. Rama Reddi, Sardar Rao Bahadur Bhimbhai Ranchodji Naik, Mr. Chandulal P. Parikh, Mr. Chunilal B. Mehta, Rao Bahadur K. I. Thadani, Mr. Nizam-ud Din Hyder, Rao Saheb P. V. Deshmukh, Mr. L. F. H. Goodwin, Mr. Roger Thomas, Kanwar Raj Nath, Seth Jivandas Ladhabhai, Dr. Nazir Ahmad, Mr. R. G. Saraiya, Mr. Y. G. Deshpande, Rai Saheb Kalidas Sawhney, Mr. J. C. McDougall, Mr. Vishnu Sahay, Mr. V. Ramdas Pantulu and Mr. J. Vonesch.

Cotton Forecast Sub-Committee.—Constituted by the Committee at its meeting held in February 1933, this Sub-Committee is concerned with matters connected with the improvement of the accuracy of cotton forecasts of India. It usually meets half-yearly, a day or two before the meetings of the full Committee. Two meetings of this Sub-Committee were held during the year under report. The composition of the Sub-Committee was as follows :—The President (*ex-officio*), The Vice-President, the Agricultural Commissioner with the Government of India (*ex-officio*), the Director-General of Commercial Intelligence and Statistics, the Director of Agriculture, Bombay Province, the Director of Agriculture, Punjab, the Director of Agriculture, Madras, the Director of Agriculture, United Provinces, the Director of Agriculture, Central Provinces and Berar, the Director of Agriculture, Sind, the Director of Agriculture, H. E. H. the Nizam's Government, the Commissioner of Agriculture, Baroda, the Director of Statistics, H. E. H. the Nizam's Government, the Director of Land Records, Central Provinces and Berar, the Deputy Director of Statistics, Department of Commercial Intelligence and Statistics, the Statistical Officer, Department of Industries and Commerce, Madras, Dr. T. E. Gregory,

Mr. J. Vonesch, Mr. L. F. H. Goodwin, Sir William Roberts, Mr. Chunilal B. Mehta, Mr. Roger Thomas and Dr. V. G. Panse.

Cotton Ginning and Pressing Factories Sub-Committee.—This Sub-Committee is appointed by statute to attend to matters arising out of the Cotton Ginning and Pressing Factories Act, 1925. Two meetings of this Sub-Committee were held during the year under review. The members of the Sub-Committee during the year were :—The President—Mr. P. M. Kharegat—the Vice-President, the Co-operative Banking Representative—Sir Chunilal V. Mehta (*ex-officio*), Sir Purshotamdas Thakurdas, Sir Sorab Saklatvala, Mr. J. Vonesch, Sir William Roberts, Mr. W. J. Jenkins, Rao Saheb P. V. Deshmukh, Dr. Chellaram Shewaram, Captain S. R. Pocock, Mr. Chandulal P. Parikh, Mr. L. F. H. Goodwin, Mr. J. M. Doak, Mr. J. C. McDougall and Dr. Nazir Ahmad.

Research Students Selection Sub-Committee.—This Sub-Committee is concerned with the selection of students for scholarships or training grants for research in the several sciences relating to cotton. The members of this Sub-Committee during the year under review were :—The President—Mr. P. M. Kharegat, The Vice-President—Sir Chunilal V. Mehta, Dewan Bahadur Sir T. Vijayaraghavacharya, Dr. W. Burns, Dr. Nazir Ahmad, Mr. K. Ramiah and the Secretary.

Standards Sub-Committee—Constituted in April, 1933, this Sub-Committee is responsible for the preparation, for use in India, of universal standards of certain growths of cotton dealt with in common both by the East India Cotton Association and the Karachi Cotton Association and of certain other varieties with which only the former Association is concerned. Five meetings were held during the year. The following were the members of this Sub-Committee during the period under review :—Mr. C. P. Bramble (Representing the Imperial Council of Agricultural Research), Mr. Haridas Madhavdas and Mr. Jamnadas Ramdas (Representing the East India Cotton Association), Mr. W. S. Priestley and Mr. Kisharam Lekhraj (Representing the Karachi Cotton Association, Ltd.), Rao Bahadur Sir Madhaorao Deshpande and Mr. Suganchand Tapadia (Representatives of cotton growers of *Oomras* tract), Mr. Y. R. Joshi and Mr. A. J. Kapadia (Representatives of cotton growers of Broach tract), Mr. Mulchand V. Shah and Mr. Bansilal Jivanlal Desai (Representatives of cotton growers of *Dholleras* tract), Mr. F. B. Lokshmeshwar

and Mr. S. T. Patil (Representatives of cotton growers of *Kumpta* tract), Mr. Vadilal Chunilal Doshi and Mr. Vrajlalbhai Narottamdas Trivedi (Representatives of cotton growers of *Mathia* tract).

In addition to the above Sub-Committees, Special Sub-Committees are appointed from time to time to deal with specific matters which do not directly fall within the purview of any of the above Sub-Committees. The Special Sub-Committee on Crop Cutting Experiments on Cotton, referred to in the last year's report, again met during the year under report, for the purpose of examining and reporting on the replies received from the Provinces and States on the proposed co-ordinated scheme of crop-cutting experiments on cotton on an all-India basis. The object of this scheme is to obtain, as early as possible, reliable standard yield figures of cotton which would be of material assistance in the preparation of cotton forecasts. The report of this Special Sub-Committee and the recommendations of the Committee thereon are dealt with under "Cotton Statistics."

During the period under review the following members represented the Committee on the Board of Governors of the Institute of Plant Industry, Indore :—Mr. P. M. Kharegat, C.I.E., I.C.S., (President, Indian Central Cotton Committee), Sir Chunilal V. Mehta, K.C.S.I. (Vice-President, Indian Central Cotton Committee), Mr. W. J. Jenkins, C.I.E., I.A.S., (Director of Agriculture, Bombay Province), and Mr. D. N. Mahta, (Secretary, Indian Central Cotton Committee).

Mr. H. Sitarama Reddy represented the Committee on the Imperial Council of Agricultural Research up to the 31st March, 1941, when he retired and Mr. Roger Thomas was appointed in his place. Under Article 51, as amended, of the Articles of Association of the East India Cotton Association, the Committee is entitled to nominate, from amongst the growers' representatives, three persons, whether members of the Association or not, not having dealings in forward contracts, as Directors of the Association. Rao Bahadur Sir Mahdaorao Deshpande, Mr. H. Sitarama Reddy and Sardar Rao Bahadur Bhimbhai Ranchodji Naik were elected by the Committee for the Cotton year under review.

The Committee is an Associate Member of the International Federation of Master Cotton Spinners' and Manufacturers' Associations.

2. ADMINISTRATION.

Mr. D. N. Mahta continued as Secretary of the Committee throughout the year. Dr. Nazir Ahmad continued as Director of the Committee's Technological Laboratory except for a period of two months when he was on leave. The receipts of the Committee during the year amounted to Rs. 6,66,552 and the total expenditure to Rs. 8,88,519. A statement showing the receipts and expenditure of the Committee as well as the Balance Sheet for the year as at 31st March, 1941, are given in Appendix II.

The day-to-day administration of the Committee is carried on with the help of the Standing Finance Sub-Committee which exercises its powers under Rule 10(2) of the Indian Cotton Cess Rules, and is the principal executive body of the Committee. Subject to such restrictions as may, at any time, be imposed by the Committee, the Finance Sub-Committee exercises all the powers of the Committee in regard to the control and disposal of the funds of the Committee and such other powers as may be delegated to it. It is a statutory Sub-Committee consisting of nine members, including the President and the Vice-President, who are *ex-officio* members, the Vice-President being the *ex-officio* Chairman. By resolution of the Committee, one of the members must be a representative of cotton growers and one an Agricultural Officer. Members of this Sub-Committee during the period under review were:— Sir Chunilal V. Mehta (*Vice-President*), Chairman; Mr. P. M. Kharegat (*ex-officio*); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Mr. J. Vonesch; Mr. W. J. Jenkins; Mr. Chandulal P. Parikh; Mr. Chunilal B. Mehta and Sardar Rao Bahadur Bhimbhai Ranchodji Naik.

Matters of a general nature not involving finance, which cannot be postponed for consideration to the usual half-yearly meetings of the full Committee, are dealt with by the help of the *Local Sub-Committee*, which is composed of local members and those residing within easy reach of Bombay. The members of this Sub-Committee during the year under review were :—The President (Mr. P. M. Kharegat), The Vice-President (Sir Chunilal V. Mehta), Sir Purshotamdas Thakurdas, Sir Sorab Saklatvala, Mr. Chunilal B. Mehta, Mr. J. Vonesch, Mr. L. F. H. Goodwin, Mr Chandulal P. Parikh, Mr. W. J. Jenkins, Mr. A. P. Darlow, Sardar Rao Bahadur Bhimbhai Ranchodji Naik and Rao Bahadur Sir Madhaorao Deshpande. Six meetings of this Sub-Committee were held during the year.

3. MEETINGS.

Two meetings of the Indian Central Cotton Committee were held during the year under review. At the first meeting, which was held at Bombay on the 17th and 18th January, 1941, the Committee was mainly concerned with the consideration of the Indian cotton situation arising from the loss of markets in Europe and unsettled conditions in the Far East as a result of the war. There was a very full discussion on the subject which culminated in the following resolution being passed *nem. con.* :—

" The Indian Central Cotton Committee views with increased concern the low prices of Indian cotton, especially short staple cotton, mainly as a result of the loss of foreign markets in Europe and unsettled conditions in the Far East, and feels that the economic condition of the Indian cotton grower is in large part precarious and there are strong reasons for believing that it will further deteriorate unless prompt steps are taken to deal with the situation. The Committee accordingly recommends that the Government of India should take such steps, in the interests of the cotton grower, as may be necessary to relieve the situation. The Committee, in this connection, desires to make the following recommendations :—

(1) The Government of India, in co-operation with manufacturing and trading interests, should take effective measures to expand the consumption of cotton goods, and cotton and woollen mixtures in this country and their export overseas. These should include *inter alia*

(*a*) directions to the Department of Supply and the Indian Stores Department that, except in such cases where it is absolutely essential to ask for cloth requiring the use of long staple imported cotton, specifications for their requirements should be so framed or altered as to encourage the use of Indian cotton ;

(*b*) representations to all Colonial and Empire Governments to ensure that India's cotton goods are admitted to those countries on the same terms and conditions as are accorded to British cotton goods ;

(*c*) the adoption of suitable measures for restricting the import of cotton goods and artificial silk yarn and piecegoods into this country ;

(*d*) the establishment by Government of a central export organisation with suitable arrangements for the inspection of goods before export and the deputation of a trade delegation to other countries for the purpose of carrying out propaganda and exploring the possibilities of introducing Indian cotton manufactures.

(2) Subject to the exigencies of war demands on shipping, more adequate facilities should be provided for the export of Indian cotton, special preference being given to short staple cotton.

(3) Foreign cotton should not be purchased by Government for sale in India.

(4) Financial assistance should be afforded to mills and the trade by Government for the warehousing or stocking of more than their normal holdings of short staple cotton.

Should Government so desire it, the Committee will be prepared to appoint a small Sub-Committee to discuss with the representatives of the Government of India any points that may arise in connection with the measures suggested in this resolution."

The second meeting of the year was held on the 18th and 19th July, 1941. This was the usual monsoon meeting at which the progress reports on the various schemes financed by the Committee and programmes of work are examined. The progress made in connection with the resolution passed by the Committee at its previous meeting was reviewed at this meeting, and satisfaction was expressed that, as a result of the Committee's recommendations, the Supply Department had relaxed the specifications in regard to its requirements of textile goods, thus enabling Indian cotton to be used to a greater extent in the manufacture of such articles than had been possible before. As regards the question of setting up an export organisation for the purpose of extending the markets for Indian cotton and piecegoods, it was agreed that although, owing to various factors, the problem was not so acute as it was in January 1941, when the resolution referred to above was passed, it was nevertheless desirable to pursue the matter further and to work out the details of the proposed organisation. The replies received from certain provinces on the view expressed by the Committee that the most direct way of dealing with the problem of the disposal of India's surplus production of short staple cotton was to curtail the area under it, were also examined at this meeting, and it was noted that compulsory curtailment of acreage was not generally favoured owing to the difficulty of recommending an alternative cash crop to the cultivator and the fact that low prices in any one year automatically resulted in reduced acreage in the following year. At this meeting, the Committee also considered a proposal for the award of prizes for clean-picking of cotton, and decided that a scheme should be put up for studying the economics of this question by conducting experiments in certain areas. The question of widening the Broach Hedge Contract was also considered, and it

was agreed to recommend to the East India Cotton Association to examine, as a special case, the proposal of permitting the tendering of saw-ginned Indian American growths against this contract, at a very early date. Considerable discussion took place on the subject of the disparity in prices between fuzzy American cotton seed and *desi* seed in certain provinces, and the desirability of undertaking propaganda to dispel the prejudice against the use of the fuzzy type of seed, and it was decided that a suitable scheme for investigating the subject should be put up for the consideration of the Committee. Among the new schemes considered and approved at this meeting were the schemes for the improvement of Dharwar-American cotton, two marketing survey schemes—one for the Madras Province and the other for Gujerat and the adjoining Agencies and States of Kathiawar and South Rajputana—and a Model Projects Scheme for the extension of improved methods of cultivation in the Rohilkhand and Kumaon Circle of the United Provinces.

The January meeting of the Committee was followed by the Second Conference on Cotton Growing Problems in India. About fifty workers engaged in cotton research all over India attended the Conference and 45 papers, covering all aspects of cotton improvement,—"Cotton Genetics and Breeding," "Cotton Agriculture," "Cotton Technology," "Cotton Statistics" and "Cotton Pests and Diseases"—were read and discussed. The proceedings of the Conference have since been published.

4. PROVINCIAL COTTON COMMITTEES.

The value of Provincial Cotton Committees in dealing with problems of provincial and local importance has been stressed on more than one occasion in the past; it is evident that such problems can be visualised best by those on the spot, and from this aspect the views of Provincial Cotton Committees are of much value in aiding the Indian Central Cotton Committee to arrive at decisions on the matters submitted for its consideration. The work done by these Committees in the Provinces, in which they have been actively functioning, has proved of material benefit to the Governments concerned.

CHAPTER II.

COTTON STATISTICS.

India ranks second amongst the cotton growing countries of the world; on the average of the five years ending 1939-40, production of Indian cotton represented some 18% of the total world production, the share of the U. S. A. being 42%. The total area under cotton in India, during the year under review, was 22,902,000 acres, showing an increase of 1,322,000 acres over the figure of the previous year. With the exception of the United Provinces, where there was a reduction in the area, most of the other cotton growing provinces and States recorded increased acreage. The total estimated outturn for 1940-41 was 5,785,000 bales, against 4,909,000 bales, in 1939-40, the average yield per acre being 101 and 91 lbs. respectively. In all cotton growing Provinces and States other than Baroda (where the total production was lower despite the increased acreage), the outturn was either higher than or nearly equal to that of the previous year. The quantity of cotton pressed, including loose cotton consumed in mills in India during the year and the extra-factory consumption of cotton taken at 450,000 bales was 6,939,000 bales of 400 lbs. each.

Dissemination of information regarding the statistical position of Indian cotton constitutes an important function of the Committee. The price level of cotton, as of any other marketable commodity, is affected by changes in demand and supply, which are ultimately measured by the yard-stick of statistics. By studying carefully figures on the cotton acreage, production, and resultant prices in different countries of the world for periods in the past, it is possible for a cotton grower, dealer or manufacturer of cotton goods to work out certain laws which he may fit to his immediate conditions and thus be able to forecast, to some extent, the trend of future demand or future prices. Further, accurate statistics furnish a convenient and reliable means of studying the history of the cotton industry in different countries and in different parts of the same country. By the issue of bulletins, leaflets and press notes, from time to time, during the year, the grower and the trade were kept in touch with the statistical position of Indian cotton.

1. IMPROVEMENT IN STAPLE AND YIELD.

The ascertained area under improved strains of cotton was 6,617,000 acres or 29% of the total, against 28% in the previous year. That, with the

introduction and extension of superior varieties of cotton, there has been an improvement in the staple of the Indian cotton crop, will be apparent from the following table :—

CHANGE IN THE CHARACTER OF THE INDIAN COTTON CROP.

Indian cotton crop classified according to varieties and staple length.

(Based chiefly on the 'Estimates of Area and Yield of Principal Crops in India' and 'Cotton Forecasts' published by the Department of Commercial Intelligence and Statistics in India).

(Excludes Burma) (Quantities are in thousand bales* of 400 lbs. each).

Descriptions of cotton.	Average 1922-27.	Average 1935-40.	1940-41.	% increase (+) or decrease (—) of col. 4 over col.2.
(1)	(2)	(3)	(4)	(5)
Short staple—below ⅞".				
(1) Bengals	905	1,219	1,176	
(2) Oomras	1,890	1,294	1,366	
(3) Central India	324	254	346	
(4) Broach (Part)	65	218	221	
(5) Dholleras	525	426	314	
(6) Kumpta & Upland (Part) ..	(*a*)	23	55	
(7) Bijapur & Bagalkot Jowari ..	(*b*)	149	33	
(8) Westerns (Part)			108	
(9) Warangal & Cocanadas	49	27	33	
(10) Salems	30	22	5	
(11) Chinnapathi	39	43	1	
(12) Comillas			49	
Total Short staple — Quantity	3,827	3,675	3,707	—3
Total Short staple — % on "Total-All Staples"	70	66	64	

* Statistical bales containing 400 lbs. of cleaned (lint) cotton.

(*a*) Included under item (19), separate figures not being available.

(*b*) „ „ „ (20) „ „ „ „

Descriptions of cotton.	Average 1922-27.	Average 1935-40.	1940-41.	% increase (+) or decrease (—) of col. 4 over col. 2.
(1)	(2)	(3)	(4)	(5)
Medium and Long staple—$\frac{7}{8}$" and above.				
(13) Americans—Punjab and Sind (staple 1" and above) †	..	170	250	
(14) Americans—Punjab and Sind (staple below 1")	264	828	829	
(15) C. P. and Berar Verum	..	30	67	
(16) Hyderabad Gaorani	332	133	143	
(17) Broach (Part)	214	171	2	
(18) Surti			142	
(19) Kumpta & Upland (Part) ..	259	170	151	
(20) Westerns (Part)	251	69	39	
(21) White & Red Northerns			17	
(22) Tinnevellies (including Karungannies)	155	141	159	
(23) Cambodias	147	170	210	
(24) Jarila	..	(c)	50	
(25) Buri	..	..	19	
Total—Medium & Long staple — Quantity	1,622	1,882	2,078	+28
Total—Medium & Long staple — % on "Total-All Staples"	30	34	36	
Total—*All Staples*	5,449	5,557	5,785	+6

(c) Included under item (2) separate figures not being available.

† Includes 'Punjab-American 289-F,' 'Sind Sudhar (Sind-American 289-F-1)' and 'Punjab-American 289-F/43.'

It will be seen that the proportion of cotton of staple length $\frac{7}{8}$" and above to the total production increased from 30% in the quinquennium 1922-27 to 34% in the quinquennium 1935-40; the proportion in 1940-41 was 36% against 38% in 1939-40. The production of 'medium and long staple' cotton

in 1940-41 increased by 456,000 bales or 28% as compared with 1922-27; under "short staple' there was a reduction of 120,000 bales or 3%. The production of cotton of staple length '1" and above,' which was practically nil in 1922-27, rose to 344,000 bales in 1940-41.

There has also been a noticeable improvement in the yield per acre, as will be seen from the following table, in which two sets of figures, one based on the official crop forecasts and the other on the figures of actual crop accounted for by mill consumption, exports and extra-factory consumption, are given:—

CHANGES IN UNIT YIELDS OF COTTON IN INDIA.

(Excludes Burma).

Year. (1st Sept.—31st Aug.)	Area (Thousand acres.)	Production Government estimates. (Thousand bales of 400 lbs. each).	Yield per acre (lbs.) Col. 3 / Col. 2.	Approximate (commercial) crop. (Thousand bales of 400 lbs. each.)	Yield per acre calculated from approximate (commercial) crop (lbs.) Col. 5 / Col. 2.
1	2	3	4	5	6
Average 1922-27 ..	24,723	5,449	87	*5,954	96
„ 1927-32 ..	24,738	5,206	84	*5,851	95
„ 1932-37 ..	23,912	5,315	89	*6,447	108
1937-38 ..	25,746	5,722	89	†6,370	99
1938-39 ..	23,482	5,051	86	†6,051	103
1939-40 ..	21,580	4,909	91	†5,884	109
1940-41 ..	22,902	5,785	101	†6,924	121

* Calculated from mill consumption (*a*) + exports (*b*) + extra-factory consumption (*c*). Variation in stocks has not, however, been taken into account.

(*a*) Mill consumption in Burma included up to 31st March 1937.

(*b*) Includes exports from Burma up to 1934-35.

(*c*) The new figure for extra-factory consumption, *viz.*, 450,000 bales for the whole of India, based on enquiries conducted by the Committee, in selected areas, has been used throughout.

† Best estimate of the crop as arrived at by the Indian Central Cotton Committee in connection with the annual post-mortem examination of all-India cotton forecasts.

From the second set of figures given in Column 6, it will be seen that the average yield per acre rose from 96 lbs. in the quinquennium 1922-27 to 108

lbs. in the quinquennium 1932-37. The average yield in 1940-41 was 121 lbs. per acre against 109 lbs. in 1939-40.

A report on the estimated production of cotton according to staple length for 1940-41 season was issued in August 1941; the trade estimates of the crop were also presented in this report. Of the official estimate of 5,785,000 bales (compared with the trade estimate of 6,760,000 bales), 6% was of staple length 1" and above and 30% of staple length $\frac{7}{8}$" to 31/32".

2. DEMAND FOR VARIOUS TYPES OF INDIAN COTTON.

Statistics relating to internal and export demand for various types of Indian cotton are compiled in the Secretary's office from information furnished on a voluntary basis. These are of considerable value, not only to the trade and industry but also to those entrusted with the responsibility of shaping and directing the cotton policy of the country. The statistics collected for the year 1940-41 are given in Appendices III and IV. Receipts at mills during the season were higher by 1,260,000 bales while exports were down by 260,000 bales, as compared with the previous season. Export demand for short staple varieties, particularly *Bengals*, *Central India* and *Dholleras*, showed a falling off, the total shrinkage in the exports of such cotton (below seven-eighths of an inch in staple) being 382,000 bales; the exports under long and medium staple increased by 122,000 bales.

3. STOCKS.

The information collected in respect of stocks held on the 31st August, 1941, is contained in Appendix V. Stocks of Indian cotton held in India by the mills and the trade at the end of the season 1940-41 increased by 721,000 bales over the previous year. Of the stocks of 1,219,000 bales held by the trade (excluding spinning mills) on August 31, 1941, against 1,039,000 bales on the corresponding date of the previous year, increases were recorded mainly under Bengals and Oomras.

As the season adopted for the cotton crop of the Madras Province is the year ending 31st January, figures of stocks held in the province on this date are collected annually in addition to the figures relating to the 31st August. The relevant figures for the 31st January, 1941, together with comparative details for previous years, are given in Appendix V.

As in the past, mills, trade associations, market committees and other authorities gave valuable assistance in the collection of figures of stocks of cotton held in the country at the end of the season. Much ground, however, still remains to be covered before the statistics can be claimed to be complete.

4. INDIAN MILL CONSUMPTION.

Figures of consumption of Indian cotton in mills in British India and Indian States for the years 1926-27 to 1940-41, based on the monthly statements issued by the Committee, are given in Appendix VI. The total consumption of Indian cotton in mills in India during the season under report, *viz.*, 3,617,147 bales, showed an increase of 567,041 bales as compared with the previous season, and constitutes an all time record. Bombay Island alone accounted for about 61% of the increased consumption. The balance of 39% was distributed over other mill centres except Mysore where there was a slight reduction.

5. EXPORTS.

The exports of Indian cotton from British India during the season totalled 2,012,000 bales against 2,301,000 bales in 1939-40. On the average of the five financial years ending 1939-40, the value of cotton (including waste) exported from British India formed 39% of the total value of "Raw materials and produce and articles mainly unmanufactured" exported, and 18% of the total value of all merchandise exported.

6. STATISTICS OF COTTON PRESSED.

During the season 1940-41, 4,285,417 bales of cotton were pressed in British India and 1,782,868 bales in Indian States, making a total of 6,068,285 bales for all-India; the corresponding figures for 1939-40 were 3,600,197, 1,399,826 and 5,000,023 bales, respectively. For India as a whole, the average net weight per bale of cotton pressed during the season under report amounted to 393 lbs. against 391 lbs. in the previous season.

Under the provisions of the Cotton Ginning and Pressing Factories Act, 1925, every cotton pressing factory in British India is required to submit, to the prescribed authority, weekly returns of the number of bales pressed in it. Indian States having pressing factories co-operate in enforcing the submission of similar returns by factories situated within their limits. The all-India figures of cotton pressed are published weekly in the *Indian Trade Journal.*

In addition to the figures in running bales, their equivalents in statistical bales of 400 lbs. net are compiled by the Director General of Commercial Intelligence and Statistics and published monthly in the same Journal.

The suggestion of the East India Cotton Association that the statistics of cotton pressed should be compiled on the basis of the recognised trade descriptions as adopted in the revised trade classification* of Indian cottons, is under the consideration of the Government of India.

7. UNPRESSED (LOOSE) COTTON STATISTICS.

The statistics of cotton pressed do not account for the whole of the Indian cotton crop as, apart from the quantity utilised for extra-factory consumption, chiefly in the form of *kapas*, mills situated in cotton growing areas often use considerable quantities of ginned, unpressed cotton. Prior to 1936-37, the relevant statistics relating to unpressed cotton were compiled on a voluntary basis but from 1936-37 they are being collected under statute by an amendment of the form of return submitted by mills under the Indian Cotton Cess Act, 1923. Similar information for Indian States is obtained on a voluntary basis through the courtesy of the Darbars concerned. During the year, 523,001 bales of unpressed cotton were consumed in mills in India against 474,336 bales during the preceding year. The relevant figures for 1926-27 to 1940-41 are given in Appendix VI to this report.

8. STATISTICS OF COTTON GINNED.

The figures of cotton pressed do not cover the entire crop as, apart from ginned unpressed cotton consumed in spinning mills for which figures are available, both ginned unpressed cotton and *kapas* are also utilised for domestic purposes, such as, hand-spinning, making of quilts, mattresses, etc., for which there are no reliable data. If, however, ginning returns could be instituted all that would be necessary for arriving at the actual crop would be to estimate the quantity of *kapas* used for domestic purposes. The two returns would at the same time serve as checks on each other. The submission of such returns is already in force in the Central Provinces and Berar and in the Bombay Province, while in Sind, the necessary rules under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, have been framed. It was reported last year that the various other cotton growing provinces and States had been requested to take steps to amend the existing

*Appendix VII (page 155).

Cotton Ginning and Pressing Factories Act or other similar legislation in force to provide for the monthly submission of returns of cotton ginned by ginning factories. Most of the Provinces and Indian States have agreed to the Committee's proposal but it will take some time before the necessary legislation is passed. Meanwhile those States which have agreed to furnish the returns have been asked to do so with effect from the 1941-42 season. Arrangements will be made for the publication of the consolidated figures when the returns are more complete.

9. INDIAN COTTON SITUATION—1940-41.

The season started with a carryover of 19·3 lakhs bales (400 lbs. net) held by the trade and spinning mills in India. The actual crop of 1940-41, on the basis of cotton pressed and unpressed cotton consumed in mills amounted to 64.9 lakhs bales (excluding extra-factory consumption of 4.5 lakhs bales), of which 30.0 lakhs bales are estimated to have been of staple length $\frac{7}{8}''$ and above. The total supply for the season, including extra-factory consumption, was 88.7 lakhs bales, being higher than that of the previous season by nearly 12.9 lakhs bales. Out of the supply of 88.7 lakhs bales, about 38.5 lakhs bales were estimated to be of staple length $\frac{7}{8}''$ and above.

There was a spurt in the internal demand for Indian cotton, owing to restricted imports of cotton goods, and increased requirements of the Defence Services and the overseas markets. As a result, the consumption of Indian cotton by Indian mills reached the record figure of 36.2 lakhs bales, being 5.7 lakhs bales higher than that of the previous season. Out of the total consumption, 20.0 lakhs bales are estimated to have been of staple length $\frac{7}{8}''$ and above. This group accounted for nearly 55% of the increased consumption. The total mill receipts of Indian cotton during the season, on the basis of voluntary returns, amounted to 41.0 lakhs bales of 400 lbs. net, showing an increase of nearly 12.3 lakhs bales, or 43%, over the previous season. Bengals, Americans, Oomras, Central India, Southerns and other varieties accounted for 7, 30, 27, 11, 13 and 11% respectively of this increase.

As regards the position of exports, this was the first season in which there was complete cessation of exports to the Continent, which, on the average of the three seasons ending 1938-39, accounted for an annual offtake of 8.6 lakhs bales of Indian cotton, including roughly $6\frac{1}{2}$ lakhs bales of staple length below $\frac{7}{8}''$. While the entire surplus of cotton of staple length $\frac{7}{8}''$ and

above, resulting from the loss of the Continental markets, may be said to have been absorbed by the increased consumption in this country, only two-fifths of the surplus below $\frac{7}{8}''$ in staple was so utilised. With the announcement regarding the freezing of the Japanese assets, the situation at the close of the season was overshadowed by the prospective loss of the Far Eastern market for Indian cotton. The total exports from British India during the season amounted to 20.1 lakhs bales, of which, cotton of staple length $\frac{7}{8}''$ and above formed 7.2 lakhs bales or 36%.

According to the voluntary returns, the stocks of Indian cotton held by the mills and the trade on the 31st August, 1941, amounted to 26.4 lakhs bales of 400 lbs. net, including 10.4 lakhs bales of cotton of staple length $\frac{7}{8}''$ and above, against the corresponding figures of 19.3 and 8.4 lakhs bales for the previous year. The calculated carryover on the basis of the figures of actual production, mill consumption, and exports works out to 27.9 lakhs bales as follows :—

	In lakhs of bales of 400 lbs. net. (Excludes extra-factory consumption).		
	Total.	$\frac{7}{8}''$ and above.	Below $\frac{7}{8}$.
Stocks held by the mills and the trade on the 31st August, 1940	19.3	8.4	10.9
Probable production in 1940-41	64.9	30.0	34.9
Total supply	84.2	38.4	45.8
Indian mill consumption in 1940-41 ..	36.2	20.0	16.2
Exports during 1940-41	20.1	7.2	12.9
Total distribution	56.3	27.2	29.1
Estimated stocks held by the mills and the trade on the 31st August, 1941 ..	27.9	11.2	16.7

10. COLLECTION OF STATISTICS OF COTTON IMPORTED INTO BOMBAY BY ROAD.

Reference was made in the last year's report to the proposal for the collection of the statistics of cotton imported into Bombay by road, through

the agency of the Bombay Port Trust in collaboration with the East India Cotton Association, the Bombay Chamber of Commerce and certain other interested parties. The proposal is dependent upon necessary legislation being passed by the Government of Bombay to empower the Bombay Port Trust with the required authority. Owing to the war, however, the position of railways vis-a-vis road transport has greatly altered and it has been decided to hold the matter in abeyance for the present.

11. PERIODICAL REVIEWS OF THE STATE OF FOREIGN TRADE IN INDIAN COTTON.

By arrangement with the Director General of Commercial Intelligence and Statistics, a clerk is employed in his office, at the Committee's expense, with the object of furnishing monthly reviews on the state of foreign trade in Indian cotton. These reviews, besides giving information on the developments in the cotton situation in general, also contain statistics relating to Indian cotton based on the British Indian trade accounts as well as on the trade accounts of the importing countries. The reviews are supplied to trade bodies represented on the Committee and to cotton spinning mills on request ; they are also available to the public at a small charge.

12. IMPROVEMENT OF COTTON FORECASTS.

As usual, the all-India cotton forecasts of the 1939-40 season were subjected to a post-mortem examination by the Cotton Forecast Sub-Committee of the Indian Central Cotton Committee, at the close of the season, with a view to detecting sources of errors and suggesting remedial measures. It was decided in connection with these examinations, that if possible, the yield estimates of prominent commercial firms should be given for purposes of comparison with the official forecasts. The question of applying a correction factor to the anna valuation figures reported for Sind and the Gujerat block of the Bombay Province, to which reference was made in the previous report, was considered by the Committee and it was decided to make a general recommendation to the effect that the forecasting authorities should, in preparing the outturn figures for the forecast Reports (particularly for the April Forecast), apply their own correction factor to arrive at what might appear to them to be the most probable estimate in the light of the data available with them at the time. In the case of Sind, it was further suggested that the question of incorporating in the April Forecast Reports, a sentence to the effect that the commercial crop (the best estimate based on trade statistics)

amounted to.....bales on the average of the previous ten (or five) years against.....bales officially estimated, might be examined.

On the general question of improving cotton forecasts, several suggestions were made by the Committee during the year and the Director General of Commercial Intelligence and Statistics has been requested to examine and report on the various recommendations. It is also proposed to examine the basis of the normal anna valuation in the various Provinces and the procedure adopted in estimating the outturn in terms of annas. In order to improve the cotton forecasts, a systematic scientific revision of the standard yield figures is considered necessary and the first essential is the devising of a proper sampling technique for obtaining the average yield. Proposals in this connection are being examined by the Committee and it is hoped shortly to devise a simple and practical scheme for obtaining this very necessary information.

As in the past, by arrangement with the Director General of Commercial Intelligence and Statistics, the estimates of the cotton crop were received by wire and released in Bombay at a time previously fixed to synchronise with the time of their release in Calcutta.

13. REPORT ON THE ACCURACY OF THE ALL-INDIA COTTON FORECASTS.

As usual, a report on the accuracy of the all-India cotton forecasts of the 1939-40 season was published in August. According to this report, the commercial crop of 1939-40 was estimated to be in the neighbourhood of 5,884,000 bales, whilst the figure forecasted in April 1940, was 4,942,000 bales. The forecast estimate was thus lower by 16 per cent on the basis of the actual crop as arrived at by the Committee ; this was probably due to the observed underestimation in the forecasts of the United Provinces, the Punjab, Sind, Bombay Province, Madras Province, Central India and Rajputana.

14. PUBLICATIONS.

The undermentioned statistical publications were issued during the year under report :—

(1) *Statistical Leaflet No. 2.*—Seventh Issue (1939-40), "Stocks of Indian raw cotton held in India by the mills and the trade on 31st August, 1940."

(2) *Statistical Leaflet No.* 3.—Seventh Issue (1939-40), "Receipts at mills in India of raw cotton classified by varieties—1939-40 season."

(3) *Statistical Leaflet No.* 4.—Seventh Issue (1939-40), "Exports by sea of Indian raw cotton classified by varieties—1939-40 season."

(4) *Statistical Leaflet No.* 1.—Eighth Issue (1940-41), "Report on the staple length of the Indian cotton crop of 1940-41 season."

(5) *Statistical Leaflet No.* 5.—Fifth Issue (1939-40), "Report on the accuracy of the all-India cotton forecasts of 1939-40 season."

CHAPTER III.

RESEARCH.

Research into cotton problems of all-India importance constitutes perhaps the most important function of the Committee. A number of research schemes, among which cotton breeding schemes for the improvement of quality naturally take pride of place, are in operation in the various cotton growing Provinces and States. The majority of these schemes are financed entirely by the Committee, while the cost of others is borne partly by the Committee and partly by the Provincial Government or State concerned. The Committee also maintains a well-equipped Technological Laboratory where research on cotton technology is carried on. In addition, trained Technological Assistants are posted at the Cotton Research Stations at Lyallpur, Mirpurkhas, Cawnpore, Surat, Dharwar, Coimbatore, and Parbhani, to help the botanists in charge in their work of breeding improved varieties of cotton.

1. FUNDAMENTAL RESEARCH.

Fundamental research on cotton is carried on at the Institute of Plant Industry, Indore. This Institute was established in 1924 with the object of providing a central research station for cotton in the black soil area of the Malwa Plateau. In April 1940, the working of the Institute was re-organised, as a result of which, fundamental research on genetics, plant physiology and field plot technique is carried out under a special scheme—Cotton Genetics Research Scheme—which is financed and controlled directly by the Committee. An annual subsidy of Rs. 30,000 is, however, given to the Institute for plant breeding work on cotton and other crops for the Member States, as well as for seed multiplication, distribution and demonstration and such agronomical and chemical investigations as might be considered necessary for the benefit of the States. Last year was the first season of the working of the Institute under the new arrangement; breeding work, varietal tests and seed multiplication and distribution were carried on along the lines of the previous years and satisfactory progress was reported to have been made. An interesting investigation which deserves mention was that relating to the effect of fire-heating on the properties of black cotton soil in comparison with those of gray and humus-treated soils. Light fire-heating of the surface layers of the

black cotton soil (the *rab* process) greatly increased the crop growth and yield. Similar differences in yield were obtained by (*i*) surface application of gray soil which occurs naturally in many low lying areas adjoining black cotton tracts, and (*ii*) heavy application of humic manures throughout the profile of the black cotton soil. A study of the properties of these groups of soils was completed during the year and the results have been published. A review of the progress made in some of the investigations under the Cotton Genetics Research Scheme is given below :—

Genetics of lintless genes.—Five genes responsible for lintlessness in Asiatic cottons have been identified and, while some of the inter-relationships among them have been worked out and published, work is in progress to complete the study and to determine the linkage relationships of the several lintless genes to other known genes. The data obtained, last year, from the study of a single F_2 family indicated that there was free assortment between 1027 lintless gene li_a and the anthocyanin gene *R* ; this was confirmed during the year from the study of a larger F_2 population, showing definitely that the lintless gene li_a is not linked with anthocyanin locus in Asiatic cottons. The independent segregation of this gene with lint colour gene *K* was also confirmed in a cross with narrow *Kokati* type. The study of the crosses with *arboreum* lintless types has indicated that wherever there is segregation of hairy linted and hairy lintless, there is a significant deficiency of the latter group which can only be explained as being due to the action of modifiers whereby some lintless plants appear as linted. The study of the problem is being continued in crosses between 1027 lintless and normal linted *arboreums*.

The differences in viability according to environment in the normal linted, short linted (heterozygous) and lintless (homozygous) types, reported last year, were tested during the year in two replicated experiments, one conducted at Indore and the other at Sri Ganganagar. The germination percentages obtained showed that while there was no difference in viability among the three types under Ganganagar conditions, there were significant differences at Indore, the normal linted being more viable than short linted, and short linted in turn being more viable than lintless. The difference in viability could thus account for the deficiency of lintless types sometimes observed.

The three types, normal linted, short linted and lintless were found to have different growth rates and the final heights attained by the plants were in the order, linted, short linted and lintless. The effect of the lintless gene is

to shorten the internodes, making the plant appear dwarfish. The same effect was seen on the leaf shape also where a genotypical narrow was made as broad. This was made clear in a family homozygous for broad leaf but segregating for lintlessness where there was a shortening of the lobe length in the homozygous lintless group.

Genetics of entire leaf mutant.—The entire leaf mutant from C. 7 was obtained from Coimbatore and crossed with different leaf shape allelomorphs. All the F_1s exhibited complete dominance of the laciniated or narrow or broad character according to the parent used. The F_2 of only one cross, namely, broad (*Malvi 9*) x Mutant has been studied so far and it gave 45 broad to 11 mutant, showing a single factor difference between the two, which confirms the results obtained at Coimbatore. The behaviour of the F_1s in other crosses has indicated that this mutant belongs to the same leaf shape allelomorph series.

Genetics of seed fuzz.—In the crosses made between *Buri* naked (really tufted) with two fully fuzzy types, C. 920, M. U. 4, to study the inheritance of fuzziness, the F_1 and F_2 means and the F_3 behaviour gave an indication of the non-fuzzy nature being dominant.

Anthocyanin genetics.—Studies on several crosses with a type, *Tellapathi* (*G. arboreum* var. *neglectum* forma *indica*) obtained from Coimbatore have shown it to be a new member of the anthocyanin multiple allelomorphic series. It is designated R_2^{GS} and is characterised by the absence of a leaf spot and pigmentation in stamen filaments. R_2^{GS} is complementary with R_2^{OS} for the production of pigment in stamen filaments and leaf spot.

X-ray work.—The significant increase in the ginning percentage as a result of X-raying seeds of M.U. 4 and Upland strain, observed last year, was again manifest during the year. The results of the past three years have shown the behaviour of the treated seed, more particularly of that treated for 20 minutes to be consistent in respect of high ginning percentage. In the two previous years, no difference was observed in any other character in M. U. 4 as due to X-raying; during the year, however, in X_3 generation, there were significant differences in halo-length in X-rayed material. The difference between the two treatments, 10 minutes and 20 minutes, is significant and both treatments are significantly higher than the control. The test will be continued. E.B. 31 and M.U. 4 maintained their differences over control in node number.

Wilt work.—As pointed out previously, breeding for wilt resistance is carried on in three directions: (1) the replicated progeny rows, (2) non-replicated progeny rows in wilt land and testing the small bulks in replicated trial later, and (3) Swalof method of mass selection.

The breeding material consisted of six crosses (F_2^s), *Malvi* 9 and *Malvi* 9-20 crosses with each of the three resistant strains, *Jarila*, V. 434 and V. 438. The experiment was in duplicate, one in the wilt land and the other in the wilt-free land. In so far as wilt-incidence is concerned, there was no difference in the three sets of crosses, the mortality per cent being nearly the same in all. In the agricultural characters, however, *Malvi* x *Jarila* cross was better than others in yield, ginning percentage and halo length. It is now proposed to confine further selection work to this cross (F_3 stage). The study of the genetics of wilt resistance has shown that while there is a definite indication of resistance being dominant, nothing definite can be said at this stage about the number of factors involved.

Heterosis.—The *arboreum* strains, *Malvi*, *Bani* and C. 520, on which considerable work has been done with regard to quantitative inheritance, were utilised for determining the physiological basis underlying the manifestation of hybrid vigour. The three parents and their reciprocal F_1s were grown during the year in a randomised and replicated experiment and the following observations were taken :— Plant height every 15 days, leaf area, dry weight of leaves and stems separately and dry weight of reproductive parts on random duplicate plants taken from each plot at intervals of 20 days. A rough examination of the data so far available showed that it was the increased meristamatic capital with which the hybrids started which accounted for the manifestation of vigour. This was more than apparent in the cross, *Malvi* x C. 520, where due to greater parental differences in seed weight and meristamatic tissues, the differences between the reciprocal F_1 were very striking.

Physiology.—The study of the competition effect between the Upland and *desi* cottons in a mixed crop was continued during the year. The trial consisted of two parts, (1) in which *Malvi 9* was grown mixed with three cottons, another *Malvi* strain, *Verum 434* and an Upland strain, and (2) where *Malvi 9* was grown mixed with 4 selected strains of Upland cottons. The first part which had run on for three years was closed. The only result that did not tally with the results of the two previous years was the behaviour of the mixture of *Malvi 9* and *Verum 434*. In the two previous seasons the spinning

value of this mixture was distinctly better than would be expected from the average value of the two components; in the year under report, however, the mixture gave a lower value than either of the components in fibre length and spinning value and a higher value than either of the components in fibre weight.

To test whether the treatment of seeds with hormones would result in better germination, better stand and higher productivity, a preliminary experiment was carried out during the year with proprietary products—Seradix A and Hartomone A, both of which are well known to stimulate root production. There were no significant differences in germination in the three seed treatments, *viz.*, two hormones and water soaking, all of them giving a significantly higher germination than dry seed. The apparent response seen in the seed treatments was mainly due to the water used as the vehicle for applying the hormones. The general results thus do not appear to support the various claims put forward in favour of the proprietary preparations.

2. RESEARCH ON COTTON TECHNOLOGY.

Research on cotton technology and the testing of cotton fibres, yarns and cloth are carried on at the Committee's Technological Laboratory. A brief summary of the work done during the year is given below; full details are given in the Annual Report of the Laboratory which is now issued as a separate publication.

The total number of samples tested at the Laboratory during the period under review was 1,800 against 768 last year. The samples tested are dealt with in spinning, fibre test, yarn test and cloth test reports, which are issued on these samples. The number of such reports issued during the year was 1,046, which is nearly four times the number issued in the previous year. Amongst the tests made on samples received from Agricultural officers were *Jarila* cotton, which is now spreading rapidly in Khandesh; AGMARK samples of 1027 A.L.F. from Baroda and the adjoining British territories; medium and long staple cottons which are being tried in Bengal; and *Gaorani 6* which is now cultivated over a fairly large area in Hyderabad State.

At the request of the Indian Stores Department, facilities were provided by the Committee for the testing of Development samples and samples submitted against tenders at the Laboratory. A number of such samples were tested during the year and reports issued on them. Samples received in the

Testing House from the cotton mills and firms covered a very wide range, including fabrics of all kinds, single and ply yarns, sewing thread, parachute cloth, airmen's webbing, service dressings, absorbent cotton, etc. Tests covering a very wide range were carried out on these samples, including such tests as determination of ash content, wax content, wettability, hydrogen-ion concentration, water-proofing, etc. Several of the mills referred their specific difficulties such as, tendering of cloth, appearance of stains, presence of holes in the cloth, etc., which were investigated. The causes of the defects were found and reports issued to the mills together with suggestions for the prevention of the defects in question.

A number of technological investigations were also under progress during the year; these included the pre-cleaning and ginning of Indian seed cottons on different machines and with different settings and speeds, the effect of different treatments in the blow-room, effect of storage under Bombay conditions on the quality of Indian cottons, the influence of swollen hair diameter on the spinning quality of cottons, fibre properties in relation to seed characters, efficiency of kier boil and bleach treatments, etc.

Work on Indian linters was continued and the samples of linters for the past two seasons were analysed both by mechanical treatment and chemical process and the relationships between the results of the two treatments were worked out. Certain tests were also carried out on coir yarns at the instance of the Agricultural Marketing Adviser, the object being to see whether, on the basis of the results of such tests, any standards can be laid down for coir.

3. COTTON RESEARCH IN PROVINCES AND STATES.

(*i*) BOMBAY.

(a) Broach Cotton Breeding Scheme.—The Cotton Breeding Scheme at Broach has been in operation since April 1932. The original object of this scheme was to obtain, by selection or hybridization, suitable types of cotton possessing wilt-resistant, high yielding, high ginning and superior spinning qualities, to replace the local mixture, a large proportion of which consisted of *Goghari*, a short staple, high ginning (40%) variety. In view, however, of the Committee's policy to replace, wherever possible, short staple with medium and long staple cottons, attention is now being concentrated on wilt resistance, high yield and fibre length. The breeding of wilt-resistant types originally formed part of the Broach and Jalgaon Cotton Breeding Schemes but, as it was felt that the testing of cotton strains should be done under the

optimum conditions of wilt infection, and, as experience showed that these conditions, especially soil temperature in pots, were difficult to maintain at Broach and Jalgaon, the work was transferred to Poona in June 1935. In August, 1936 the wilt part of the two schemes was extended and it was decided that it should be treated as a separate scheme from the 1st April,1937.

During the year under review, three of the best plants from each of the segregates-7-29 of [(B.D. 8×G.A. 26) ×B.D. 8] F_7 and 3-1 of [B.D. 8×(B.D. 8 ×S. 12-1)] F_5—were tested against I.A.L.B. and B.D.8, in wilt-sick and wilt-free plots; the segregates showed neither mortality nor partial wilting on wilt-sick soil, indicating thereby that they were as resistant as the resistant parent B.D. 8. The lint yield of both the segregates was significantly higher than that of B.D. 8, in both wilt-sick and wilt-free soils.

Of the seven best segregates, *viz.*, 76-1, 76-12, 1-2, 1-6, 5-18, 7-29, and 3-1, tested against B.D. 8 and Broach Local as checks, on wilt-free soil, segregate 5-18 alone was found to be equal to the local in respect of yield of seed cotton and lint; the remaining segregates and B.D.8 were significantly inferior.

Village trials in the Broach District were conducted at three representative centres of the black soil area, *viz.*, at Nabipur, Kelod and Kervada and at one centre in the *Goraṭ* soil area, *viz.*, at Kamrad. Segregates 76-1, 1-2, 1-6 and B. D. 8 and Broach local were used for these trials and the results showed that at all the three black soil centres, the local yielded significantly more than the segregates and B. D. 8; segregate 1-6 was significantly superior to B. D. 8 at Nabipur, and 76-1 significantly inferior to it at Kervada. The results obtained at the *Gorat* soil centre were not conclusive. The low yield of the segregates and B. D. 8 was probably due to the exceptionally abnormal season. The tests carried out on the farm from 1937-38 to 1940-41 with segregates 76-1, 76-12, 1-2, 1-6 and 5-18, using B. D.8 and local as checks revealed that in respect of lint yield, segregate 1-6 was better than the local, while 5-18 was on a par with it. The remaining segregates, though somewhat low in yield, were definitely superior to B. D. 8. None of the segregates was inferior to the local in respect of ginning percentage, while segregates 1-6 and 5-18 were superior to it.

A nucleus of pure seed of B. D. 8 strain, which is being distributed in the district since 1935-36, was maintained. In addition, segregates 76-1, 1-2, and 1-6 were multiplied to procure sufficient seed for village trials and for multiplication in the district.

Under the wilt breeding part of this scheme, the object is to evolve a cent per cent wilt-resistant type from the material available at Broach. During the season under report, B. D.8-B_4 and N.S. 12-B_5, N. S. 12-H_1 and N. S.12-H_3, isolates from B.D. 8 and N. S. 12, respectively, are reported to have been found completely free from wilt. It is reported that the material of the composition of (B. D. 8 × G. A. 26)F_6 and (B. D. 8 × G. A.26)F_8 has reached homozygosity for 100 per cent wilt-resistance. The study of the genetics of wilt-resistance has shown that wilt-resistance is due to a single gene.

(b) Jalgaon Cotton Breeding Scheme.—This scheme has been in operation since April 1932. Its original object was to obtain, by selection or hybridisation, suitable wilt-resistant types with heavy yielding, high ginning and good spinning qualities, to replace the local mixture of N.R. and *Banilla* cottons in Khandesh. Wilt breeding work was originally included in the Broach and Jalgaon Cotton Breeding Schemes, but, in August 1936, it was decided that the wilt work should be treated as a separate scheme from the 1st April, 1937.

During the year under report, the 23 plant selections of Dokras cotton, which had been found to be superior to *Jarila* in ginning percentage and either equal or superior to it in staple length in the previous year, were tried n five replications against *Jarila* as the control; seven selections, none of which was inferior to *Jarila* in respect of yield, ginning outturn or staple length, have been found worthy of further trial. With the object of evolving desirable *Jarila* types, combining the high ginning percentage of N. R.5 and cent per cent wilt resistance of the New Million Dollar, the progeny of the following crosses were examined and selections made :—

1. [(*Jarila* × N. R.5) × N. M. D.] F_2
2. (*Jarila* × N. R.5) F_3
3. [(*Jarila* × N. M. D.) × *Jarila*] F_1

Of the 124 lines of the first cross that were under observation, 17 were found to be practically as resistant to wilt as *Jarila* and superior to it in respect of ginning outturn. Five desirable plants from each of these have been selected for further study. In addition, 40 plants from the best lines of the second cross and 27 plants from the third cross have been selected for testing in the ensuing season.

89 Dokras cultures were tested for wilt resistance in artificially infected plots and those which showed desirable combinations of characters were selected.

Village trials were conducted at 11 centres for testing the yielding capacity of *Jarila*; in four centres the yield of *Jarila* was lower, in another four it was as good as that of the local, and in the remaining three centres it was better than the local. The ginning percentage of *Jarila* during the year ranged from 33 to 36.7.

Jarila was sold by auction at various centres in Khandesh at a premium of Rs. 27 to Rs. 47 over Broach.

Work under the wilt breeding section of this scheme conducted at Poona consisted of testing a few of the best plants of New Million Dollar which is reported to be homozygous for 100% resistance, under optimum conditions of infection. Results of the study of the genetics of wilt resistance showed that resistance in *G. arboreum* is controlled by three complementary factors, wilt resistance in F_1 being incompletely dominant.

(c) Scheme for breeding wilt-resistant cottons in Surat area.—This scheme was sanctioned by the Committee in August 1936 and commenced work in April 1937. The object of the scheme is to obtain a strain of cotton completely resistant to wilt and suited to the natural conditions obtaining in the Surat tract. This is sought to be achieved either by selection in 1027 A. L. F. or by crossing this cotton with B. D. 8 or other wilt resistant strains.

The testing work during the year was carried out in the wilt-infected plot at Shera. F_2 populations of the following four crosses were tested for wilt-resistance :—

(1) (8-1 × K. F.) F_2

(2) (8-1 × B. D. 8) F_2

(3) $[8\text{-}1 \times \{(\text{B. D. } 8 \times \text{G. A. } 26) \times \text{B. D. } 8\} F_6\text{-}1\text{-}6]\ F_2$

(4) $[1027\ \text{A. L. F.} \times \{(\text{B. D. } 8 \times \text{G. A. } 26) \times \text{B. D. } 8\} F_6\text{-}1\text{-}6]\ F_2$

As selections from 1027 A. L. F. suffered from wilt to the same extent as the control, it is now proposed to discontinue further work on them. Segregate 8-1 showed no mortality, though there was some evidence of partial

wilting ; it will be further tested in wilt-sick soil at Shera and in pot cultures at Poona.

(d) Scheme for improvement of Wagad cotton at Viramgam and Jagudan.— While examining the possibility of growing medium and long staple cottons in the short staple areas of India, the Committee, in August 1935, decided that, in view of the absence of any serious attempt to improve the cotton of the large *Dholleras* tract, a comparative study of Indian and Iranian *herbaceum* cottons should be undertaken, with the object of finding out one or more suitable types for the tract. A special officer was deputed to Iran to collect *herbaceum* types of cotton grown there and, in August 1936, a five-year scheme was sanctioned for the improvement of *Wagad* and *Mathio* cottons, the work on *Wagad* cottons being centred at Viramgam and that on *Mathio* at Amreli. Simultaneously, a small immune area is maintained at Jagudan under irrigation to safeguard the work at Viramgam. The objects are the improvement of *Wagad* cottons for (*a*) quality and yield and (*b*) earliness in order to escape frost, and the replacement, if possible, of the inferior *Mathio* cotton of Kathiawar by early *herbaceum*. These are sought to be achieved by (*a*) selection in *Wagad* cotton, (*b*) hybridisation with Surti-Broach quality cottons like 1027 A. L. F. and B. D. 8 and (*c*) hybridisation with Iranian *herbaceums* known to be early and of better quality.

The season during the year was very dry, the rainfall being only 10.96″ against the average of 22.7″. The standard strain, *Wagad 8*, though superior to the local in yield and ginning percentage was found to be lacking in the desired staple quality. Eleven *Wagad* selections and the promising segregate, H.S.B. 1, were tested in progeny rows with *Wagad 8* and local *Wagad* as controls. Five selections and segregate H.S.B. 1 were found to be splitting with regard to ginning percentage but, as further improvement in them appeared possible, they have been retained. Three old varieties—local, *Wagad 8* and Segregate 4-1, two new ones—H.S.B. 1 and N. 89—and three promising types—115, 126 and S. 89—were compared with *Wagad 8* in random replications ; S. 89 was significantly inferior to all, indicating that it does not do well under the dry conditions of Viramgam. It is, however, reported to be suitable for the heavy rainfall tracts of Dholka.

Selections from crosses, back crosses and composite crosses of *Wagad* 8 with Surti-Broach quality cottons were continued and in all 174 plants were retained for further testing. One back cross, B.C.W. 8×22-3-1 F_2, was found to be very promising.

Work on crosses with Russian, Persian, East Iranian and early *herbaceums* was continued with a view to evolving desirable types combining early maturity with fine, long staple.

In a replicated trial of early, promising Viramgam selections (S. 115, 126 and 314) with *Wagad 8*, local *Wagad* and segregate 4-1, at Jagudan, S. 115 and 126 gave promising results in respect of yield and early maturity; it is thought that S. 115 may prove to be a better substitute for *Wagad 8*. In another trial of five open-boll types, with *Kanvi* local and *Chokadia* as controls, Segregate 7-1 gave better results in respect of yield, ginning outturn and spinning performance, but it suffered from the defect of late maturity, defective boll-opening and early boll-shedding. *Chokadia*, though early, high yielding and a good ginner, was very poor in respect of spinning capacity. Work to evolve a new type to replace *Chokadia* is in progress at Viramgam.

(e) Scheme for inclusion of Northerns and Westerns cottons in programme of work of Dry Farming Scheme at Bijapur.—This scheme was sanctioned by the Committee in August 1936, in pursuance of the recommendations of the Agricultural Research Sub-Committee, which, while considering the subject of the possibility of growing long and medium staple cottons in the short staple cotton areas of India, expressed the view that in short staple cotton areas like the Bijapur district in the Bombay Province and Raichur and Gulbarga districts in the Hyderabad State, where the rainfall is limited and precarious, a solution of the problem confronting the successful growing of medium and long staple cottons might be found in devising suitable dry farming methods. The scheme came into operation in June 1937.

During the year under review, the work under the scheme consisted of two parts. In the first part, six replicated and randomised experiments were carried out. One experiment was intended to test the comparative performance of the four strains, N. 14, H. 1, *Jayawant* and local *Kumpta*, and the effect on them of farmyard manure and castor cake; the object of the remaining five was to assess the value of different operations and treatments included in the Bombay Dry Farming method, *viz.*, tillage, bunding and mulching, spacing, rotation, fallowing and green manuring. In the second part *Northerns* and *Westerns* cottons were tested on a field scale under the Bombay Dry Farming method for comparison with the local cultivators' methods. Owing to severe shortage of soil moisture and general drought conditions,

however, the cotton crop failed entirely, and no yields were obtained in any of the experiments.

As the scheme had been in operation for four years, and no definite results had been obtained, it was decided not to extend it on the completion of its sanctioned term in May 1941.

(f) **Scheme for interspecific hybridisation in cottons at Surat.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years, with the object of obtaining, if possible, fully fertile hybrids between Asiatic and American cottons, combining the useful agronomic characters of both, particularly the good staple length of the American and hardiness and adaptability to Indian climate of the Asiatics. Work on crossing Asiatic and American cottons, begun at Surat in 1932, had already yielded 23 hybrids in which the American parents used were mostly the acclimatised Upland types from different parts of India, while the Asiatic parents were forms of *G. herbaceum* and *G. arboreum*. The hybrids produced from these were, however, sterile and efforts to induce fertility in them were successful only when they were back-crossed to American types.

As a result of the large scale crossing work done under the scheme, 40 first generation hybrids have been produced, which are all self-sterile. It has been possible, however, to induce fertility by back-crossing them with New World cottons. Out of 56 back-cross plants, 47 have been found to be more or less fertile, providing varied and useful material for further selection. From the F_2, F_3 and F_4 generations of these back-crosses, 91 plants with a ginning percentage, ranging from 25.6 to 41.2 and staple length from 22.8 to 33.8 mms. have been selected for further study. Some of these show better combinations than the American parents. B.C. No. 22, obtained by back-crossing (Co. 2 × Red *arboreum*) F_1 to Co. 2, has been found to be highly fertile and gave promising material for selection. The fact that a few of the first back-crosses are highly fertile is very encouraging. The American parents so far used in crosses have been mediocre ones, but a few long staple types have now been obtained from America and are being used in further work.

During the year under review, the F_1 hybrids (New World × Asiatic), which were sterile, were back-crossed to higher chromosome parents, with the object of inducing fertility and 24 bolls having 37 seeds were obtained. Cuttings and grafts of sterile F_1 hybrids were treated with colchicine; out of

twenty three grafts thus treated, one showed characteristic effects and set a stray boll. The progeny of various fertile tetraploids and hexaploids produced by colchicine treatment was raised on a large scale but it proved to be very slow growing and late maturing. The progeny of two hexaploids was observed to be free from jassid and leaf-blight attack. The number of seeds per boll and the ovule : seed ratio were very low, indicating that the population in general was still chromosomally unbalanced.

Cytological examination of the first generation hybrids between American and Asiatic cottons showed that, with the exception of 3, all had 39 (26+13) chromosomes and that sterility was due to a set of 13 chromosomes remaining unpaired, which resulted in the formation of unbalanced germ cells. 14 fertile first back-crosses had 52 chromosomes and the detailed study of the chromosome pairing in them explains in general the variation in fertility of the hybrids.

(*ii*) SIND.

(a) **Scheme for Cotton Jassid Investigation.**—In Sind, jassid attack is most prevalent in the south-east Tharparkar district where it is proposed to establish a compact block of long staple cotton. One of the harmful effects of this pest is improper development of the seed, so that, in certain seasons, good seed is not available for sowing purposes, and this gives a setback to the extension of improved varieties. Accordingly, in August 1937, the Committee sanctioned the above scheme, for a period of three years and six months, with the object of studying the habits of jassids, their alternative hosts and the manner in which certain varieties of cottons resist jassid attack. In January 1941, the scheme was extended up to 18th April, 1945. The progress made during the period under review is described below :—

The incidence of jassid attack, during the year was greater than in the previous year, though the damage caused was mild throughout the province. The observations on the relative infestation of jassids on different varieties of cotton, sown on the same date, showed that S. L. D-1 and M-4 had the lowest jassid population, M.2 came next, whilst Sind *Sudhar*, 4F-98 and T-23 had the highest. In the seasonal sowing carried out with M-4 and Sind *Sudhar*, it was found that the intensity of jassid attack increased with the delay in the date of sowing. Early sowing from mid-March to mid-April is, therefore, recommended.

Jassid nymphs had no difficulty in developing on any cotton variety—susceptible or resistant, hairy or non-hairy. The examination of varieties in search of plant characters determining resistance to the pest indicated that hairiness of cotton leaves was not a reliable character for judging jassid resistance. Besides cotton, the pest is reported to be present on several other crops, such as *bhindi*, brinjal, potato, hollyhock, *pattir* and *phalsa*, and this precludes the observance of a close period as a measure of control. Applications of larger doses of artificial manures had marked effect in reducing the jassid population.

The occurrence of the pest was more marked when the crop was sown with 6″ spacing, than in 12″, 18″ and 24″ spacings. In another experiment, in which Sind *Sudhar* was treated with different doses of potash and phosphorus, it was found that the jassid population decreased considerably with the application of higher doses of the manures, the plots with no manure showing the largest number of jassids.

(b) Scheme for Investigation into Black-headed Cricket in Sind.—This scheme was sanctioned by the Committee in January 1938, for a period of three years, with the object of establishing the identity of the pest and studying its life history, seasonal behaviour and the extent of the damage caused by it. Before the opening of the Lloyd Barrage, the Black-headed Cricket had been known as an occasional pest of Sorghum and cotton in Upper Sind and some parts of the Punjab. With the introduction of cotton cultivation on the Right Bank of the Indus, however, this insect has become a serious pest of cotton in the seedling stage in Khirtar and Johi tracts in Sind and in some parts of Baluchistan. The pest appears in the cotton fields towards the end of April and disappears in June. The period of its activity synchronises with the sowing time of cottons and causes almost wholesale destruction of the crop. The pest appears to belong to the same species as met with in Baluchistan, *viz.*, *Gryllulus domesticus*. Since April 1941, the scheme has been merged in the scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan.

It is reported that the pest responsible for the damage was re-identified as *Gryllulus domesticus*, Linn. Two other species of crickets, one of which has been identified as *Liogryllus bimaculatus*, have been observed to cause slight damage to the cotton crop. Fifteen specimens of the pest were reared in the laboratory from the egg to the adult stage for the purpose of studying

its life cycle. The females lay a large number of eggs near one another in either stiff soil that cracks or in lighter soil; sandy loam and sandy soils are not favoured for egg-laying. The total duration of the nymphal stage in the laboratory varies from 32 to 61 days. It was noticed that the insect passed through 3 generations during the year, against 4 in the previous year and that it over-wintered in the nymphal and adult stages.

During the course of the field survey, it was observed that in Khirtar tract the pest was entirely in the nymphal stage towards the middle of April. These nymphs and the adults that emerged from them, being very active and voracious, were responsible for most of the damage done to the cotton crop. The insects bored a hole into the seed coat and ate away the kernel within. In the Dadu district where the pest appeared late and after the germination of the seed, the leaves were chopped off up to the 2nd leaf stage.

In view of the enormous damage caused by the pest in the Khirtar tract the undermentioned bait was used for its control but though effective, it was not economical, probably because the control work was undertaken on a small scale :—

Sodium fluosilicate	1 seer
Rice bran	20 seers
Molasses	1 seer

with enough water to make it crumbly.

The damage caused by the pest was ascertained from April to June or July, 1940, and it was found that the first sown crop suffered most, the damage varying from 25% to cent per cent.

(c) **Scheme for production of long staple cottons in Sind.**—Sind is the only Province in India which may be said to be suited for the production of long staple quality cottons of the Egyptian and Sea Island types. Ever since the opening of the Lloyd Barrage, the question of the establishment of a compact block of long staple cottons in Sind has engaged the attention of the Indian Central Cotton Committee. Although attempts in the introduction of long staple quality cottons in Sind, in the past, have not met with the success it was anticipated they would, the project, nevertheless, is considered to have possibilities which are well worth investigating. Accordingly, a five-year scheme for cotton breeding investigations for the production of long staple cottons has been launched. The scheme came into operation in April

1940. The experimental stations are situated at Mirpurkhas and Oderolal. The most important problem to be tackled is to see whether high quality cottons, preferably of the 289F types, but possessing a better staple than Sind *Sudhar*, can be produced. The aim is to evolve a cotton longer than 1-1/16" which would spin about 60 counts and yield not less than 6 *maunds* of seed cotton per acre. The more important items in the programme of work are :—(1) Production of hybrids, using the back-cross technique, between cottons of 289F type and long staple cottons. (2) Testing of various selections from 289F. (Experience has shown that conditions for growth of cottons of 289F type are more favourable in Sind than in the Punjab). (3) Importation of fresh material from a wide range of places, such as, Egypt, Sudan, South Africa, U. S. A. and Brazil, *etc.*, for acclimatisation, selection and for providing material for hybridisation purposes. (4) Working out a system of cultivation best suited for long staple cottons.

Two groups of cotton, *viz.*, *hirsutum* and *barbadense*, which consisted mostly of types imported from abroad, were tested during the year under review and observations recorded. Reciprocal crosses were made between each of the long staple *hirsutum* types and Sind *Sudhar*, the established commercial variety of long staple cotton in Sind. Crosses were also made with M. 4, a desirable new Sind-American strain under trial. All available good material has been sown as F_1 in the current season along with their respective parents.

In the experiment 'Ridge *versus* flat sowing,' Sind *Sudhar* and Sea Island 2-4 were sown on ridges and flat beds in randomised replicated plots, and yields of seed cotton and final stand were compared. Sind *Sudhar* is reported to have given significantly better yield than Sea Island. Ridging made no difference in yield though stand on ridges was slightly better than on flat beds.

(d) **Scheme for bollworm investigation and clean-up campaign in Sind.**—This scheme was sanctioned by the Committee in January 1940, for a period of 3½ years, and it came into operation on the 1st September, 1940. The work proposed to be carried out under the scheme during the first seven months was (*a*) to survey the host plants during the off-season of cotton and (*b*) to test the efficacy of the implements evolved elsewhere. During the remaining period, it is proposed to carry out a clean-up campaign and to study its effect on the succeeding year's crop. The investigations are confined to the Tharparkar district.

During the year under review, a study of the incidence of the pest in 17 different localities, selected at random all over the Tharparkar district, was undertaken. The progress of the bollworm attack during the period—September to October—was noted by examining samples of buds, bolls and flowers every fortnight. The results showed that the Pink bollworm was only a minor pest of cotton in the Tharparkar district. As regards the Spotted bollworm, it was found that, in areas growing more rice than cotton, the attack was very high, the range being 25-61% and the average 35%; in areas growing partly rice and partly cotton, the attack ranged from 9-28%, the average being 15·9% and in areas growing mostly cotton, the attack was comparatively mild, ranging between 2-20%, the average being 10·5%. The intensity of infestation was at its maximum from mid-September to mid-October. It is suspected from the data that the cotton in the rice area serves as a breeding ground for the bollworms in Sind.

The life-history of the Spotted bollworm was studied under laboratory conditions at Mirpurkhas and the duration of the life-cycle was observed to vary with the season, being 18-28 days in summer and 37-60 days in winter. Observations on the relative incidence of the two species of the Spotted bollworms—*Earias insulana* and *Earias fabia*—showed that the former is predominant. The larval parasites met with in the area were *Rhogas testaceous*, *Actia aegyptia* and *Elasmus Sp.*, but they did not appear to control the pest to any appreciable extent, as they became active towards the close of the cotton season when the pest had already established itself. *Microbracon Lefroyi*, which is the most effective larval parasite of the bollworms is reported to be altogether absent. Trials for the introduction of this parasite in this tract were approved by the Committee and are now under way. Besides cotton, the pest is reported to infest *Abutilon indicum* (*Patitir*), *Hibiscus esculentus* (*Bhindi*), and *Althea rosea* (Hollyhock), which enable it to carry over from one season to another. Cotton stalks allowed to remain in the field after harvest are reported to serve as the major source of infestation for the succeeding cotton crop.

Preliminary investigations on the efficacy of implements for removing the cotton stalks showed that the '*Kudali*' was more suitable for the purpose than the plant puller. This implement was accordingly employed for removing cotton stalks and for destroying '*Patitir*' (*Abutilon indicum*) over an area of about 3,000 acres. For the campaign in 1941-42, a compact area of

570 sq. miles, mostly in the Samaro and Umerkote *talukas* of Tharparkar District, has been selected. Propaganda work in this connection has already been started.

(*iii*) PUNJAB.

(a) **Punjab Botanical Scheme.**—This is one of the earliest schemes of the Committee. Sanctioned in 1923, for a period of five years, it came into operation in August 1925, and has been extended from time to time, the last extension, which will expire on the 28th February, 1945, being approved by the Committee at its meeting held in January 1940. Until 31st March, 1936, the entire cost of the scheme was borne by the Committee, but since then, the expenditure is shared on a 50:50 basis between the Committee and the Provincial Government. The original object of the scheme was to investigate the causes of the periodic failures of American cotton in the Canal Colonies of the Punjab where a large area is annually grown under such cottons, and to obtain suitable types of American and *desi* cottons. In view, however, of the immediate economic importance of improved types of cotton, work was concentrated on breeding, and a separate physiological scheme was sanctioned for investigating the problem of periodic failures of American cotton. The Botanical scheme has thus been concerned mainly with the improvement of both *desi* and American cottons. As more than half the cotton area in the Punjab lies in the Canal Colonies, attention was first directed to the improvement of the cottons of that area. The South-Western tract of the Province, comprising the arid districts of Multan, Muzaffargarh and Dera Ghazi Khan, were given attention next and a sub-station for this purpose was opened at Multan in 1935. The first improved variety of American cotton to be given out for general distribution was 289F/43 in 1935. The area under it during 1940-41 was estimated to be some 1,21,000 acres. Other improved strains are L.S.S. and 289F/K. 25, which occupied an area of 2,09,000 and 1,86,000 acres, respectively. Amongst the *desi*, the first cotton to be evolved was *16 Mollisoni* in 1929. This was replaced in 1930 by *15 Mollisoni*, which was, in 1934, replaced by *39 Mollisoni*. The latter is now the standard *desi* cotton of the Canal Colonies and the area under it during 1940-41 was estimated to be 4,59,000 acres. *39 Mollisoni* is said to have gained so much popularity that in most parts in the Canal Colonies, it has driven other types of *desi* cotton out of cultivation. *119 Sanguineum* and *12 Sanguineum* are two other *desi* strains evolved under the scheme;

the former was the first fruit of research at the Multan Sub-Station. *119 Sanguineum* matures so early that wheat or gram can be sown after the pickings are over. Being a drought resistant, high yielding and high ginning cotton, it has become increasingly popular in the South-Western tract. *12 Sanguineum*, on the other hand, is gaining popularity in the rainfed areas of North Punjab. During the year under review, these three cottons, *viz.*, *39 Mollisoni*, *119 Sanguineum* and *12 Sanguineum*, occupied about 42 % of the total area under *desi* cottons in the Punjab.

Reselection in 289F/43 and L. S. S. strains was carried out with the object of improving the ginning percentage of the former and isolating an early maturing type from the latter. Seven hundred plants of 289F/43 were selected from cultivators' fields in 1939 and 46 plants, combining the desirable qualities, were sown during the year as single plant progenies. Of these, plants of 24 families conformed to 289F/43 type in plant habit and earliness. On the basis of laboratory data, however, only 5 families appeared promising; family 30/40 was the most promising with an average halo length of 28·8 mm. and 33% ginning outturn.

The varietal test with American strains at Risalewala showed that the strains 148F, 124F, 125F, 147F, L. S. S. and 146F were significantly better in respect of yield than 289F/43, whilst, in the test with *desi* types, none was found to be statistically superior to *39 Mollisoni*.

As in previous years, American and *desi* varieties were tested in a large number of places under the cultivators' conditions; L. S. S. gave good yield at Sargodha and Jhang and the new strain 124F showed good performance at Lyallpur, Hansi, Iqbalnagar, Military Farms, Okara, and Kot Ganeshdas. 124F has now been tested on field-scale for 3 years, and, in most of these tests, it has outyielded every other American variety. In addition to being a high yielder, it possesses excellent fibre properties and gives a ginning outturn of about 33%.

Of the *desi* strains tried, *39 Mollisoni* remained unbeaten in respect of yield at Lyallpur, Okara and Khanewal but was excelled by *138 Mollisoni* at Ferozepur, Montgomery and Gurgaon. The performance of Jubilee was noteworthy at several places. It would appear that there are certain areas in the Province where American cotton does not flourish and *desi* cotton has to be grown. It is felt that if on a part of this area Jubilee could be substituted in place of *desi*, it will be in the interest of the growers.

119 Sanguineum was tested for yield at 323 centres and was found to yield, on an average, 1·3 mds. more than the local *desi* cotton; it appears to suffer less from the attack of spotted bollworm, and possesses a better ginning outturn than *39 Mollisoni*. The financial gain to the cultivator by growing *119 Sanguineum*, instead of the ordinary *desi* cotton, is estimated at Rs. 10-13-0 per acre.

Varietal trials with seven types—*119 Sanguineum*, *39 Mollisoni*, 289F/43, 289F/K.25, 124F, L. S. S. and 4F—conducted under conditions of tenant cultivation, revealed the superiority of 124F over other American strains and of *119 Sanguineum* over *39 Mollisoni*.

(b) Scheme for improvement of Punjab-American 289F/K25 cotton.—This scheme was sanctioned in January 1938, for a period of five years and commenced work from the 9th July 1938. The object of the scheme is the improvement of 289F/K.25 cotton which was evolved at the B. C. G. A. Farm some years ago. Though this strain is very popular in the Lower Bari Doab Canal Colony and the area under it has expanded very rapidly, it suffers from the defect of susceptibility to jassid attack. One of the aims of the present scheme, therefore, is to develop jassid-resistant strains from this cotton.

During the year under review, the crop at the B. C. G. A. Farm was very satisfactory and gave an average yield of 14 maunds 23 seers per acre. Owing to the prevalence of '*tirak*' and heavy incidence of jassid infestation, conditions for selection of plants resistant to bad opening and jassids were very favourable. Out of a total of 121 single plant progenies of 289F/K.25, 89 were discarded after rigorous selection on the basis of jassid susceptibility and ginning outturn below 34%, and single plants from the remaining 32 resistant and high ginning families were retained for further trial. The chances of securing a strain of 289F/K.25 fairly resistant to jassids appear to be quite promising.

The hybrid material, grown during the year, consisted of (*a*) 25 families of F3 of (289F/K.25, 289F/43) and (*b*) 14 families of the second generation of the first back-cross with 289F/K.25. It was observed that hairiness was generally associated with jassid resistance. The ginning outturn of the F_3 plants of the cross was low compared with that of the plants of the 2nd generation of the back-cross. The most promising plants have been selected for further study.

As in the previous year, mass selection was carried out in the general crop on the B. C. G. A. farm, with a view to purifying it. Comparison of the economic characters of the selections thus made with those of the general crop showed that mass selection has improved the purity and increased the ginning outturn of the crop. No change was, however, observed in the halo length.

In the varietal test of the American strains evolved at Lyallpur and Multan conducted at Khanewal, 124F showed itself to be outstanding in respect of yield and ginning outturn. The yield of 289F/K.25 was comparatively poor, though, in other commercial characters, it was more or less on a par with 124F.

(c) **Physiological Scheme.**—Partial failures of the American cotton crop in the Punjab occurred in the years 1919 to 1921, 1926 to 1928, 1931 and 1932. The external symptoms of the cotton plants during these failures were early reddening and shedding of the leaves, premature opening of the bolls with immature seeds and low quality lint and, in extreme cases, the dwarfing of the plants. To account for these failures, various views were advanced, such as, the heat stroke theory (Milne, 1924), attack of White Fly (Roberts, 1929) and unfavourable combination of climatic and biotic factors (Trought, 1931). As, however, these theories could not be supported by sufficient data, it was thought that the failures might be due to malnutrition of the plant and a physiological scheme was accordingly started by the Committee in March 1935, to study the physiology of the cotton plant with a view to determining if possible, the nature of the nutritional disorder, its causes and the measures necessary to combat it. The scheme started work in 1935. In March 1937, the Empire Cotton Growing Corporation loaned the services of Dr. Mason to the Committee to inspect and report on the scheme and, on his recommendation, a soil survey on a large scale was undertaken to connect up soil conditions with cotton failure. The scheme is due to terminate in March 1943.

The work done so far has indicated that two sets of soil conditions are associated with the development of '*tirak*,' *viz.*, (*i*) soils with saline sub-soil and (*ii*) soils with nitrogen deficiency. These conditions may exist separately in separate fields or together, the intensity varying from field to field. Plants growing on soils of the first type appear normal until July, but later exhibit symptoms of drought. The recovery from wilting after each irrigation is of short duration and by the beginning of September, the leaves begin to shed ;

there is also considerable shedding of flowers. The few bolls that are formed, crack and are found to contain immature seeds. In soils of the second type, the growth of the plant is luxuriant when the soil is light sandy loam. Starvation symptoms appear at the bolling stage when the leaves turn yellow and red and are shed. The size of the new leaves is comparatively reduced; the number of bolls produced per plant is normal but they crack and contain immature seeds. In very heavy soils, containing alkali salts in the sub-soil, the growth, though normal for a few weeks, is later suppressed. The plants remain stunted and possess dark green leaves which show symptoms of drought. Premature defoliation of leaves and later '*tirak*' occur. '*Tirak*' is found to appear in its most serious form on sandy soils with alkali salts in the subsoil; such soils are also deficient in nitrogen. The bolls are small in size and open badly. Tannins are produced in leaves with low nitrogen content; their presence in the leaves, which can now be easily detected by a simple method specially devised and known as the 'tannin test' can be regarded as an index of nitrogen starvation. If nitrogen in the form of sulphate of ammonia is applied to a crop when the test for tannins is given by the leaves, it is found to recover within eight days after application and the appearance of '*tirak*' can be prevented. *Tirak* on the first type of soil with the alkali salts cannot be ameliorated by the application of manures, which only results in vigorous growth.

During the year under report, more than 300 soil samples from about 50 spots where normal and '*tirak*' plants were observed, were analysed to confirm the previous results. The samples were analysed for total soluble salts, soluble and exchangeable calcium and sodium and for pH. In many cases soluble sulphates, chlorides, bicarbonates and carbonates were also determined. Mechanical analyses were done wherever necessary. The result of these analyses confirmed the previous findings regarding the association of soil-conditions with '*tirak*' The soils where '*tirak*' occurred contained higher amounts of soluble or exchangeable sodium, or both, than calcium in the sub-soil. In some '*tirak*' patches, the pH was higher than the normal. In some cases, there was an increase in clay content from above downwards, while no such increasing trend was observed in other '*tirak*' patches. '*Tirak*' patches with a saline subsoil either occurred on sandy loams or on light sandy soils; the degree of salinity varied from patch to patch and even within the same patch. Normal, non-saline lands were found to be intermingled with soils having salinity in the sub-soil, in the same field.

The physical and chemical properties of the light sandy soils where the crops suffered from nitrogen deficiency did not show any special features except that the base exchange capacity of the soil in some cases was very low, *i.e.*, about 3 to 4 m.e. per 100 grams of soil. The tannin test carried out in the season again showed that soils with nitrogen deficiency are of common occurrence in the Punjab and are found mixed up with normal soils as well as with soils having saline sub-soils. The worst form of '*tirak*' occurs on light sandy soil with an alkaline reaction and it is greatly aggravated by hot weather at the fruiting stage.

The experiments on ameliorative measures for '*tirak*' conducted at Lyallpur in 1939-40 showed that, (1) late sowings greatly reduced '*tirak*' on both soil types referred to above, (2) heavy waterings at the fruiting stage decreased '*tirak*' on saline subsoils and (3) application of sulphate of ammonia remedied '*tirak*' on light sandy soils where the crop suffers from a deficiency of nitrogen. These results were tested during the season under report by laying out multiple factor experiments in different cotton growing tracts of the Punjab. Commonly cultivated American varieties and one *desi* variety were included in the tests. All combinations of 4 sowing dates (two in May and two in June), two levels of watering (normal and heavy) and two levels of nitrogen (0 and 33 lbs. N) were tried. It was found that, except on soils which are saline or alkaline within two feet from the surface, June sowing, in addition to its ameliorative effect on '*tirak*' can also give higher yields than May sowings, provided close spacing is adopted. Frequent waterings from mid-August to mid-October resulted in an increased mean yield of 5.5 mds. per acre. The response was not, however, so high on light sandy soils which are saline in the sub-soil. Applications of sulphate of ammonia gave substantial increases in yield on light sandy soils deficient in nitrogen but no increase was registered on sandy loams which are saline in sub-soil. Light sandy soils with saline sub-soil gave only a medium response to the application of nitrogen and extra-watering.

A study of the effects of salinity, temperature (September-October) and sowing time on development and spread of '*tirak*' under normal conditions of irrigation and rainfall showed that, (1) under given conditions of temperature and sowing time, the resistance to '*tirak*' declines as the salinity increases; (2) under given conditions of salinity and sowing time, the resistance to '*tirak*' declines as temperature in the month of September or October rises above the normal; (3) under given conditions of temperature and salinity, the resistance

to '*tirak*' increases as the sowing time advances from May up to the end of June. There was also an indication that an unusually warm September produces more intense '*tirak*' than an equally warm October. The weather conditions that would aggravate nitrogen defciency in the soil are being investigated.

(d) **Root Rot Scheme.**—This scheme, which was sanctioned by the Committee in 1932, is concerned with the investigation of the cause and control of root rot in the Punjab, where, particularly in the canal irrigated areas, the annual damage done to cotton by this disease is estimated at several lakhs of rupees. Both *desi* and American varieties are equally affected by the disease which makes its appearance towards the end of June and continues up to the middle of September. The organisms responsible for the disease are *R. batatícola* and *R. solani*.

During the year under report, experiments were conducted mainly at Lyallpur and Khanewal with *desi* and American cottons, to ascertain the effect of shifting the date of sowing on the incidence of root rot, the object being to evade the time of optimum activity of the causal fungi. The occurrence of the disease was found to be highest in May sown cottons and negligible in those sown in the first week of April or the end of June. Both *desi* and American cottons, when sown late and planted closely, gave significantly higher yields than the May sown cottons. The lower yields of the American varieties were due to bad opening of bolls.

The results of the experiments to test the effect of intercropping cotton with sorghum and *moth* (*Phaseolus aconitifolius*), as a measure of control against the disease, were in line with those of the previous years. In the case of sorghum, it was found that the extent of reduction of the disease varied with the period of retention of the sorghum plants in the field, whilst the removal of *moth* as early as the 1st of August reduced the mortality of cotton plants to an appreciable degree. In the mixed crop, the American cottons were observed to be significantly better in respect of yield than the control, both at Lyallpur and Khanewal. In the case of *desi* cottons, the results were not significant at Lyallpur. Sufficient data are, however, not available to explain the differences in the behaviour of *desi* and American cottons. It was observed at Lyallpur that cotton, when intercropped with cowpea and *guar*, tended to show a greater degree of resistance to the disease.

A varietal test, which included 64 foreign and local types, was tried on heavily infected soil. The varieties were sown in May so as to receive optimum infection and were replicated thrice. It was noted that all the types succumbed to the disease and showed a high rate of mortality. None of the progenies of the plants selected (117) last year showed any appreciable resistance to the disease.

(e) **Cotton Jassid Investigations in the Punjab.**—This scheme is concerned with the study of the Jassid insect in the Punjab, as regards its habits, alternative host plants and characters of the cotton plant which determine resistance to the pest.

The attack of Jassids, during the year under review, was appreciably higher than in the previous three years ; it was very serious at Sargodha and Okara, mild at Lyallpur and Montgomery and negligible at Multan and Khanewal. Of the commercial varieties, 104F, 289F/K. 25 and 124 F were found to be most susceptible, while 289F/43, L.S.S. and 186 F were most resistant. At Lyallpur, however, 4F was found to be the most resistant variety. Maximum infestation was recorded about the first half of September.

A complex experiment with 289F/43 and L.S.S. was conducted at Risalewala to test the effect of sowing-date, manuring and spacing on the incidence of the pest, but the results obtained were not significant.

The behaviour of Cambodia was again studied under artificial conditions of infestation, and it was noticed, at the end of the season, that the plants were slightly affected, but this was only temporary. In view of its high resistance, Cambodia was crossed in 1938 with 58F—a susceptible and high-yielding type—and the progenies of this cross are now under trial. The data collected do not indicate that the character of hairiness in the variety is positively correlated with resistance to Jassid.

The economic importance and seasonal distribution of the species of Jassids other than *E. devastans, viz., E. kerri, E. minor, E. punjabensis* and *E. binotata,* were studied and it was observed that at Khanewal and Montgomery *E. kerri* predominated while at Sargodha and Bhalwal, *E. minor* was in abundance.

(*iv*) CENTRAL PROVINCES AND BERAR.

Central Provinces and Berar Cotton Breeding Scheme.—The Central Provinces and Berar Cotton Breeding Scheme was sanctioned by the Committee for a period of five years with effect from the 1st April, 1939, and replaced the Central Provinces Botanical Scheme which terminated on the 31st March, 1939. The object of this scheme is to evolve, by selection or hybridisation, suitable new strains of cotton which can compete successfully with the local *Oomras* in point of ginning outturn and yield and which, at the same time, possesses a staple capable of spinning between 20s to 25s highest standard warp counts. The scheme is worked at Nagpur and at Akola, to suit the special requirements of the Central Provinces and Berar, respectively. The work done during the year is described below under ' Central Provinces Cotton Breeding Scheme ' and ' Berar Cotton Breeding Scheme.'

The Central Provinces Cotton Breeding Scheme is concerned with the breeding of improved strains of cotton suitable for Nagpur, Wardha, Chanda and parts of Chindwara districts and capable of replacing the ordinary short staple mixed cotton of these areas.

During the year under review, V. 434 was grown extensively, covering an area of 2,71,600 acres, against 1,38,425 acres last year. The performance of this cotton was fairly good throughout; and on the Akola Farm it gave an average outturn of 685 lbs. of *kapas* per acre, while on the Nagpur Farm the yield recorded was 777 lbs. per acre.

One hundred and eighty nine single plant progenies of different varieties were sown on the Nagpur Farm in small unreplicated blocks, and 32 selections, possessing high ginning and long lint characters, were retained for further study. Twelve strains, including H. 415 and H. 420, and the improved *Verum* and *Bani* strains, were tested against the local *Jari* in the different cotton growing areas of the Central Provinces, but differences in yield due to strains were found to be insignificant, though the H strains showed a high ginning percentage combined with superior quality of lint.

The Cotton Breeding Scheme at Akola is concerned with the production of high yielding superior strains of cotton suitable for the Berars and possessing a staple of at least $\frac{3}{4}''$, with the softness, colour and strength of V. 434 and a ginning percentage above 33. Breeding of high ginning new strains of *Buri* cotton for the Burhanpur tahsil also forms part of this scheme. At the Akola farm 968 single plant selections were grown for the estimation of their outturn as compared with V. 434. Detailed observations were recorded on

their performance in the field and those that appeared promising were critically examined in the laboratory with regard to the quality of lint and ginning percentage. Three hundred and sixty-one cultvres were finally selected for further study.

District trials—(31 in all)—with V. 434, *Jarila*, H. 415, H. 420 and local *Jadi* were carried in 29 representative localities of Berar; the results showed that in 19 tests the differences in yield, due to varieties, were insignificant. In 12 tests, however, the results were statistically significant.

As a result of selection work in *Buri*, 14 promising single lines with higher ginning percentage than *Buri 107* were isolated. These will be included in the preliminary yield trials in the coming season.

(*v*) MADRAS.

(a) **Pempheres Scheme.**—This scheme, as originally sanctioned, consisted of two investigations, one for the control of cotton stem weevil (*Pempheres affiinis*) and the other for the evolution of a strain in *Karunganni* cotton resistant to the harmful effects of February rains. The first problem was pursued in three directions, botanical, biochemical and entomological. On the botanical side, the aim was to evolve a strain which would not allow the insect time to complete its life cycle inside the stem; on the biochemical side the causes that made strains susceptible to the insect and the factors that helped the plants to resist its attack more efficiently were investigated; on the entomological side, efforts were concentrated to survey the distribution of the insect and to explore the possibility of checking its spread by biological methods. In July 1938, the working of the scheme was reviewed and, as it was felt that the possibilities of biological control were doubtful and that biochemical research was also not likely to lead to any successful results, it was decided that these two sections of the work should be closed down and that the physiological investigations should also be terminated, as the experimental work had been brought to a stage when further investigation could be continued by the Agricultural Department itself. It was agreed, however, that the botanical research should be continued and the work of the past year was concerned with this aspect of the scheme.

As in previous years, two generations of plants were raised during the year—one at Srivilliputhur from March to August, and the other at Coimbatore from September to March. The plant mortality was low and the adult emergence of the insect high in the summer crop raised at Srivilliputhur, in

contrast to the high plant mortality and low adult emergence in the breeding plots at Coimbatore during the cold weather. Co.2 recorded an average of 35% mortality, against 58 in the previous year.

Sixteen selections from the promising cultures of 1939-40 were tested at Srivilliputhur and 12 of these were again tried at Coimbatore. All of them, however, failed to show the desired degree of resistance, whilst only three were superior to Co.2, in respect of yield, at Srivilliputhur. In addition, another lot of 12 cultures from the desirable families were studied in rows at the Coimbatore centre. The results showed that the eight cultures were definitely more resistant than the control. The behaviour of three cultures—7178A/A1, 7178A/A2 and 7178A/A3—was noteworthy in that the mortality and adult emergence recorded were only 3 to 5%, against 20% mortality and 42% adult emergence recorded in Co.2. The yield data, however, revealed that only one culture, 7178/1-D1, combined high yield and low mortality. Cultures 7178A/A3 and 7178A/A2 were the next best. In respect of maturity, all the cultures were later than Co.2. A study of the pest resistance in 52 sibs of 7178A1 confirmed the observation that the derivatives of Moco x Co.2 cross are more resistant than Co.2. Seventeen sibs which were found to be early maturing, were carried forward for further study.

Progeny row tests were carried out with 400 cultures at Srivilliputhur and 714 at Coimbatore. Thirty-nine at the former centre and 98 at the latter, were found to be better than Co.2 in respect of yield. The cultures which recorded nil mortality and nil adult emergence at Srivilliputhur were found to be highly susceptible at Coimbatore, indicating that they were only escapes. Of the 98 high yielding cultures at Coimbatore, only 15 proved to be resistant.

Planting of other crops between the rows of cotton, with a view to controlling the incidence of the pest, was tried in an experiment conducted during the off-season. Co.3, a highly susceptible strain, was used in the trial. The data showed that the lowest mortality was recorded when cotton was grown mixed with *bajra* or *jowar*. Cotton and *Ragi* mixture was the next best. Sowing cotton thick (4" spacing) did not significantly reduce mortality.

(b) Scheme for Improvement of Mungari Cotton in Madras Province.—This scheme was sanctioned by the Committee in 1937 and has for its object the evolution of strains suitable to the red soils and combining the quality

of the *Westerns* with the yield of *Mungari*, to replace the inferior *Mungari*, the existence of which affords opportunities for mixing, with the result that the better cottons of the tract fail to get their proper value. On the black soils of Anantapur, Bellary and Kurnool districts of the Madras Presidency, cottons commercially known as *Westerns* and *Northerns* are grown. These are medium staple varieties, capable of spinning 24s to 32s. The type of cotton grown on the red and mixed soils, on the other hand, is that known by the name of *Mungari*, which is a coarse, short staple variety, similar to *Bengals*, and not fit to spin more than 8s or 10s. The co-existence of these widely different varieties in the same tract favours undesirable mixing, with the result that the better cottons suffer in value. It is to overcome this difficulty that the Mungari scheme was started.

During the year under report, seven strains, *viz.*, Co.4, × 4463, V. 434, P. 710, G. 6, 6042, and M.274 were compared with local *Mungari* cotton on both red and light black soils. On red soil, V. 434 was found to be equal to the local Mungari, while Co.4 was distinctly poorer ; on light black soil, Co.4 was equal to *Mungari* but V. 434 was distinctly inferior. When the performances on the two types of soil were studied together, strains 6042, M. 274 and P. 710 were found equal to the local. A comparison of the results of yield trials carried out during the past four seasons showed that strain H1 which is being distributed in the ' *Westerns* ' area is not suitable for the Mungari tract and that Co. 4 is more suited to light black soils, while V. 434 is more consistent in behaviour, especially on red soils.

Arrangements were made to conduct district trials at seven centres, but the trials at four centres had to be given up owing to serious damage to the plants in the early stages by the red hairy caterpillars. As regards the remaining three centres, the results obtained at one centre did not satisfy the Z test, while at the other two centres, V. 434 was uniformly good.

There is a great prospect of Cambodia strain spreading on account of its higher ginning percentage and freedom from small leaf disease. The yield, however, is reduced in some years by thrips.

During the year under report, 280 promising cultures were tested against the local ; 49, out of these, were found to be superior to the control. Arrangements were made to grow V. 434 and Co.4 on 5 acre plots, for purposes of seed multiplication. As, however, the incidence of small leaf disease was very

severe in V. 434, it had to be ploughed up ; in the case of Co.4, a yield of 650 lbs. of *kapas* per acre was obtained.

The damage caused by the red hairy caterpillars continued to be severe. Cucumbers were tried as a trap crop, and the caterpillars were found to prefer them to cotton. Experiments are in progress to determine the method of using this crop for controlling the pest.

(c) Madras Nadam Cotton Breeding Scheme.—This scheme was sanctioned in 1933 with the object of securing one or two suitable annual types of cottons capable of replacing *Nadam* (*G. arboreum* var *typicum* forma *indica*), a perennial variety, in the red soil areas of Salem and Coimbatore districts where, due to poor soil and precarious rainfall, neither *karunganni* (*G. arboreum* var *neglectum*) nor *uppam* (*G. herbaceum* var *frutescens*) can be satisfactorily grown. *Nadam*, being a perennial variety, serves as a breeding ground for pests like the stem-weevil and Pink bollworm during the close period of Cambodia prescribed under the Madras Pest Act. The object was sought to be achieved either by crossing *Nadam* with annual types or by the introduction of suitable early growing varieties.

In seven out of the eight years of study, the distribution of rainfall was unfavourable and the resulting poor stand and low productivity rendered it difficult to evaluate the merits of the several cultures raised in progeny rows. The selection work commenced by collecting the produce individually of all early maturing plants with 3 or more bolls, from bulk plots of different varieties or from segregating generations of hybrid cultures. They were then studied for economic characters and the desirable cultures (with lint length of 22 mm. and above and ginning percentage of 27 or more) were compared with K. I, instead of the local *Nadam* which was not considered a suitable standard for comparison. Nearly all the selections had to be rejected as they did not come up to the required standard. The *Nadam* variety did not seem to contain bio-types useful for growing as annuals. Selections made from the crosses were equally disappointing. In the observation plots, where varieties, strains and cultures were grown with the object of studying their suitability to the tract, none of the annual forms amongst the Asiatic cottons (except two in 1938-39) reached the 300 lb. yield which is required to make their cultivation remunerative to the growers. In the exotic group, it was only in 1938-39 that certain cultures reached the required level but these again went down in the succeeding years. None of the annual varieties—exotic or indigenous—tried so far, has thus been found to be suitable for the ecological

conditions of *Nadam* tract. Further, crossing *Nadam* with *Karunganni* has not given any suitable annual forms that might ultimately prove remunerative to the grower. The pruning of *Nadam* with the object of artificially creating a 'no cotton period' also did not produce the desired effect. The scheme was accordingly closed down on the 13th June, 1941.

(d) Scheme for Improvement of Cocanadas Cotton in Madras Province.— This scheme was sanctioned by the Committee in November 1938 for a period of five years and commenced work from the 1st February 1940. The object of the scheme is to improve the yield and ginning percentage of Cocanadas cotton, preserving, at the same time, the light pinkish colour of its lint, owing to which, it is in great demand for the manufacture of dyed yarns.

The material collected during the survey of the cotton tracts of Nellore, Guntur and Krishna districts in 1940 was sown on the red and light black soil blocks leased at Narasaraopet and on the black soil of the Guntur Agricultural Research Station, with a view to studying the variability in economic characters, such as, earliness, productivity, lint length, ginning outturn, and lint colour. Of the 85 bulks studied, 22 were sown at both centres and in more than one season. Observations were recorded for 200 plants selected at random from each of the above bulks. The data indicated that the material obtained from the Guntur district was the most promising as regards ginning percentage and halo length. Plants combining more than one character were few but there was a fairly wide scope for selection of plants with high ginning percentage.

During the year, the cotton tracts of Godavari district, Markapur and Cumbum taluqs of Kurnool district and Ongole taluq of Guntur district were surveyed and the produce of 711 individual plants was collected.

Six hundred and forty-two single plants selected last year, together with a few plants selected at Guntur for lint colour and lint length, were sown in progeny rows with the object of determining their average values for economic characters. The rows, however, could not be replicated owing to paucity in the number of seeds collected. An analysis of the data showed that in certain types the grade of the lint colour was lower in the progenies than in the parents, while in others such a change was not so perceptible. Arrangements have been made to pursue this question further, as it is considered important to evolve a type which is least likely to be affected in respect of lint colour.

At both the centres of experimentation, the strain *X20* was compared with Palnad bulk which is highly valued by the trade. The results showed that *X20* was better than the bulk in respect of yield, both on red and black soils. The strain is adjudged suitable for spinning 29's highest standard warp counts. As, however, its lint is of a light shade, it was crossed with deeper coloured types to obtain an improvement in the colour.

(e) **Scheme for investigating possibilities of control of cotton Stem Weevil of South India.**—This scheme was sanctioned by the Committee for a period of one year and three months; it came into operation on the 30th October and terminated on the 29th January, 1941.

The objects of the scheme were :—

(1) to review the work done on *Pempheres* prior to and during the enquiry,

(2) to study the distribution of the pest,

(3) to examine and record the relative incidence of the beetle in cotton and its alternative host plants, and

(4) to record the parasites found to attack *Pempheres* as well as their relative incidence on the beetle in different host plants.

During the period under review, a rapid survey of the distribution of the weevil was undertaken in selected districts of South India, *viz.*, North Arcot, Salem, Malbar, South Kanara, Trichinopoly, Tanjore, South Arcot, Chingleput and Chittoor. The data collected showed that in the North Arcot district, *Pempheres* does not occur as a pest of cotton in any of the places surveyed, although isolated specimens of the weevil were present in alternative food plants like *Hibiscus esculentus*. In Salem, only stray infestations of the weevil were found in cotton in many of the localities explored except in two taluqs, where it was a serious pest, especially of the perennial variety '*Nadam*' on which heavy multiple infestations, accompanied by large size galls, began to appear in the second year of its growth. The pest was also found to occur in small numbers in alternative food plants, particularly, *Hibiscus esculentus*. In Malabar and South Kanara, which are devoid of any cultivated cottons, the breeding of the pest in wild plants and weeds, such as *Triumphetta rhomboidea*, *Sida rhomboidea* and *Urena lobata*, was found to be profuse. The survey of a few localities in each of the remaining five districts, *viz.*, Trichinopoly, Tanjore, South Arcot, Chingleput and Chittoor, which are extremely

diverse in agricultural and climatic conditions, showed that *Pempheres* is a common inhabitant of all these districts and that it occurs either in cotton, which is cultivated in small isolated patches, or in one or more of its alternative food plants. The insect, however, does not, at present, constitute a serious pest of cotton in any of the five districts, probably because cotton has only recently been introduced in these areas.

Seasonal incidence of *Pempheres* in cotton was studied and the data, which was based on the individual examination of nearly 7,712 plants, indicated that the weevil passed through nearly three generations by the end of the cotton season in April, with a peak population density during the second wave of incidence which might fall either in February or in March.

The off-seasonal studies have indicated that *desi* cottons do not constitute a very serious factor as a source of re-infestation of the succeeding seasonal crop. 7,779 alternative host plants, composed of 23 species belonging to 9 genera, have been examined and complete data on every species have been gathered. Of the 23 species, as many as 16 have shown weevil attacks. One of the attacked species has been classed as a doubtful host and four are stated to be new.

The study of the incidence and biology of parasites has shown that parasitism in the crops examined was met with in January and February, and also later in the season in July. The highest percentage recorded is only 0·83 in January. About 15 species of parasites of the weevil were collected, either from cotton fields or from alternative food plants. The incidence of *Spathius critolaus* in these was high compared with other species. As it happened to be the most promising of cotton field parasites, its utility for purposes of biological control was studied and it was found that the female parasite, under the conditions of the experiment, was capable of distinguishing the true from false hosts for parasitisation. Its responses, however, to sensory impressions, such as, shape, texture and odour, were rather complex and no single factor by itself seemed to be responsible for the resulting behaviour of the parasite.

The data on the numerical strength and seasonal incidence of the parasitic fauna has revealed that *Entedon* is the most numerous among the parasites and occurs throughout the year save in April. *Dinarmus*, which comes second in order, appears to be rare in the season from January to April. Other species occur only occasionally and in small numbers.

Parasitism has been observed in association with six species of alternative food plants, *viz.*, *T. rhomboidea*, *H. vitifolius*, *Sida acuta*, *C. olitorius*, *Althea rosea* and *Pavonia zeylanica*. The occurrence of parasites in the last two species of plants was observed for the first time during the investigation.

The thread worm parasites of the weevil were found in association with *T. rhomboidea*, and *Malvastrum*. Records obtained indicate that the parasites associated with wild food plants are particularly abundant in waste lands, hill tracts, and forest regions of the west coast districts.

(*vi*) UNITED PROVINCES.

The United Provinces Botanical Scheme—This scheme was sanctioned by the Committee in 1938 for a period of five years. It is concerned with the development of improved strains of *Bengals* cottons for the rain-fed and irrigated tracts of the United Provinces from the material collected in the course of the survey of cottons conducted in Rohilkhand and Bundelkhand and the investigation of the possibilities of growing long staple cottons in the Pink Bollworm controlled areas. Concurrently, the suitability of the United Provinces improved cottons—C. 402, C. 520 and Perso-American—against local and other promising introductions is being tested, both on Government farms and on cultivators' fields.

During the year under review, detailed examination, purification and replicated trials of the material, derived from the original 27,000 single plant collections, were continued at each of the four research centres. Strains 'D' and 'A', obtained from the earliest material collected during 1933 and 1934, will be finally tested under cultivators' conditions before they are released for general cultivation. Strain 'D' has given consistently better yields than C. 520 and, in quality, it is equal to the latter. Strain 'A', on the other hand, is superior in quality to C. 520 and has given better yields under *barani* conditions. The studies on the survey material have indicated that selection in the survey samples is not likely to give strains with higher spinning value than 14's to 16's and that further improvement in the quality of the *desi* cottons must be looked for in hybridisation.

The selections from C. 402 and C. 520 were tested at Cawnpore and Raya and all of them gave higher yields than their respective parents at Cawnpore, whilst, at Raya, the experiment was vitiated owing to an error at the time of

sowing. All the new introductions of *desi* and American cottons are reported to be inferior in one or the other respect to C. 520 and Perso-American.

Of the 24 strains examined for wilt resistance at Raya, C. 520/9 showed an incidence of 4%, besides being resistant to root rot. The performance of this strain, however, requires to be confirmed by further testing.

Comparative yield trials of C. 402, C. 520 and Perso-American, against the survey varieties 'A,' 'D' and 'L,' with local variety as control, were carried out under irrigated and dry conditions throughout the province. Under irrigated conditions, out of 12 trials, strain 'D' gave the best results in 6 places, C. 520 in three and strain 'A,' Punjab-American and local at one place each. Although strain 'D' out-yielded C. 520 at seven centres, the differences were not significant. The results in regard to the general superiority of C. 520 and Perso-American obtained on the cultivators' fields tallied with those on the Government farms.

During the year under review, 36,968 acres were sown under C. 520 and 3,347 acres under Perso-American. Both these cottons, when marketed pure, are said to obtain a premium of annas 8 and Rs. 2, respectively, per maund of *kapas* over the *desi*. It is estimated that the growers of C. 520 and Perso-American get an increased income of Rs. 11 and Rs. 9 per acre, respectively.

(*vii*) BENGAL.

(a) **Comilla Cotton Scheme.**—This scheme was sanctioned in February 1933 and came into operation in December 1934. It is concerned with the improvement of the commercial characters of *cernuum* cotton by the isolation of coarse, high ginning and good yielding strains suitable for mixing with wool. In view, however, of the apparent absence of *cernuum* cotton and predominance of *neglectums* in the tract, it has been decided to extend the breeding work to the *neglectums* and to find out whether useful ecotypes suitable for Chittagong hill tracts can be isolated from the *cernuum* collection obtained from the Garo hills of Assam.

During the year under review, 74 villages in the Southern and Eastern parts of the hills were surveyed and 8,841 samples were collected, which are reported to be an improvement over the previous collections, those from the Bhomong Circle especially being found to possess a high ginning percentage of 40 and a staple length of 19 to 22 mms.

From the small amount of seed obtained from single lines, a few bulks were built up for trial on *jhooms* and for seed multiplication. No. 1(9) is reported to have given very satisfactory yield with a ginning percentage of 44.6. It is reported that seed of 15 bulks is available, for the first time, for carrying out yield tests on a large scale in the ensuing year.

(b) Scheme for cultivation of long staple cotton in Bengal.—The object of this scheme is to test the possibilities of introducing long staple cottons in the well drained highland soils of Bengal. It is financed jointly on a 50:50 basis, by the Provincial Government and the Bengal Millowners' Association and it came into operation in April 1938. In January 1941, the Indian Central Cotton Committee agreed to provide a supervising officer for the scheme for a period of two years. In addition to supervising cotton cultivation work at the different centres, the officer will also undertake botanical work. During the period under review, all the data collected from the preliminary trials conducted at the Dacca Farm and other places were studied in detail and eight best varieties were selected for further tests. The scheme is being worked in six centres in the highland tracts of the districts of Bankura, Midnapore, Nadia, Murshidabad, Mymensingh, and Rangpur, and the varieties of cotton being tested are Punjab-American 289F and acclimatised Egyptian cotton. The latter, however, apart from its susceptibility to anthracnose, does not appear to be suitable cotton for the areas in question. P. A. 289F, on the other hand, is said to stand up to the conditions quite well, and is reported to have given satisfactory results both in respect of quality and yield during the past two years.

(*viii*) BALUCHISTAN.

Scheme for co-ordination of Research on Black-headed Cricket in Sind and Baluchistan.—The scheme for the control of Black-headed Cricket in Baluchistan was originally sanctioned in August 1939 for a period of two years to run concurrently and in co-ordination with the scheme for investigation into the Black-headed Cricket in Sind sanctioned by the Committee in January 1938. The combined scheme for the co-ordination of work in progress in Sind and Baluchistan was sanctioned in January 1941, for a period of three years from the 1st April 1941. The objects of the scheme are : (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures, and (3) to control and prevent the pest by means of poison-baits.

The Sind part of the above scheme has been dealt with elsewhere.

During the year under report, the control work in Baluchistan consisted, as in the previous year, of the following two items :—

(1) Checking and destroying the insects at the Khirthar Canal bridges, and

(2) Controlling the pest in the *tehsil* itself.

It is reported that, unlike last year, no *tid* was seen invading the *tehsil* through the seven bridges across the Khirthar Canal. The control work was co-ordinated on the Sind-Baluchistan border, the Baluchistan staff attending to the operations in the Colony area, and the Sind staff doing work in the adjoining Khirthar area of Shahdadkot *taluka*. Extensive use of the baits was made in 13 villages to check the invading pest and free baiting material was supplied to 9 *Zamindars* in the *tehsil* and the British Cotton Growers' Association who undertook to spread it in their fields.

It is reported that the pest is more or less permanently established in the Usta *tehsil* and that there is a regular migration of the *tid* from the Kachhi district of Kalat State into the *tehsil*.

(*ix*) HYDERABAD.

(a) Botanical Research Scheme—The object of this scheme which was sanctioned by the Committee in 1929 is to study the several varieties of cotton grown in Hyderabad and to secure from them, high ginning medium staple types, to replace the existing varieties in the different parts of the State. A large number of improved pure strains has been evolved under the scheme, amongst which *Gaorani 6* is the most outstanding. The scheme was extended in July 1938 for a further period of five years from the 1st April, 1939.

Owing to the lack of suitable working accommodation for the staff at Nanded, the research work, during the year, was continued at Parbhani. The rainfall in the Gaorani tract was above normal, and distribution was unfavourable for good cotton yields ; the average yield of the improved type, *Gaorani 6*, was only about 150 lbs. of *kapas* per acre, against 133 lbs. of the local variety.

Two preliminary tests were carried out at Parbhani, one with 200 new selections of medium staple *Gaorani* and the other with about 150 slightly shorter stapled but higher ginning types, using G. 4B-5 as 'control' in the

former, and the local variety of Parbhani in the latter experiment. Fifty seven progenies in all were selected on the basis of yield and other characters for further study. A similar test, carried out on a wilt-sick plot at Latur, with 206 progenies in single rows alternated with *Gaorani* Latur, gave six progenies which showed a mortality of 10-20% compared with 65% or more of the control. With a view to finding fresh plants with desirable characters, crops raised in Parbhani and Latur, from seed obtained from villages and markets and cultivators' crops in parts of the Gaorani Protected area, were examined and out of 1,000 plants studied for fibre and seed characters, nearly 400 were retained for further study.

Varietal tests were conducted on 3 sites, at the Government Experimental Farm, Parbhani, and at Madhol and Latur and the new Research Station at Nanded. Four strains, *viz.*, G 4B-5, G 6, 6E-3 and G 115 were tested against *Gaorani Umri* at Parbhani and Madhol and against the local variety of each place at Latur and Nanded. The yields at Latur and Nanded were not significant. At Parbhani, G 4B-5 gave significantly higher yield than *Gaorani Umri* at all the three sites. G 6 outyielded the control at two sites but showed no significant difference from it at the third. The new strain, G 6E-3, excelled *Gaorani Umri* at only one site. G 115, which was reported to be promising in the previous year failed to maintain its reputation. At Madhol, both G. 6 and its sub-strain, G 6E-3, gave a significantly higher yield than *Gaorani. Umri.* G 115 failed here also to maintain its performance of the previous year; it suffered from a severe attack of anthracnose to which nearly 45% of the plants succumbed. In the varietal test conducted at the Cotton Research Station, Parbhani, with *Gaorani Umri* and 6 other improved strains, *viz.*, G. 127, G 4B-5, G 115, G. 126, G. 118 and G. 6, G. 4B-5 and G. 127 gave significantly higher yields than G. 6 and G. 118. The differences between the other varieties were not statistically significant.

Two more varietal tests—one at the Government Experimental Farm, Parbhani, with G. 16C, G. 135, G. 12F, and Parbhani 26 D-4, and the other at the Cotton Research Station, Parbhani, with G. 16C, G. 135, G. 12F, G. 12F-2, G. 157 and G. 136 were under observation. Parbhani local was used as the control at both the places. G. 16C recorded the best yield at both the localities. The yield of G. 135 was on a par with G. 16C at the former site. These two strains are stated to be promising in respect of both ginning outturn and spinning performance.

Comparative trials were carried out at the Cotton Research Station, Parbhani, Latur and Madhol. Of the 24 medium staple strains tested against *Gaorani Umri*, at Parbhani, 19 gave significantly higher yield than the control and four of these, *viz.*, G. 4B. 5, G. 115, II-38-4560 and II-38-4665 excelled G. 6 also. Five of the strains included in the experiment were found to be wilt resistant, but only two of these, *viz.*, G.M.-11 and G. 12F-2 approached G. 6 in yield, ginning outturn and fibre properties.

The comparative trials conducted at Latur and Madhol showed that none of the strains tested combined high yield with wilt resistance. The few wilt-resistant strains found in these trials gave poor yields. They were, however, superior to the local variety in respect of staple length and ginning outturn.

The study of resistance to wilt under field conditions at Parbhani gave about 68 types which were superior to the control in respect of wilt resistance. On the basis of yield, wilt resistance, ginning outturn and other characters G. 12F-2, G.161, II-39-5581 (G. 6) and II-39-5469 (G. 4) appeared to be the most promising. The 16 strains tested on wilt infected plots at Latur did not show any marked resistance to wilt. Out of 206 single plant selections picked during the previous season from wilt plot and resistant types, 11 progenies had a mortality ranging from 10-20% and only six of them gave good yield.

District trials with two improved strains and the local variety were carried out at five centres in the Gaorani protected area, 16 centres in the Oomras tract and three centres in Telingana. Though the results do not lend themselves to a valid statistical analysis, they nevertheless indicate that the improved strains do better than the local at Hadgaon and Deglur in the protected area, that Parbhani-American is suited to the hill tract and G. 16C to the plains of the Oomras area and that, in Telingana, the early maturing variety, G. 3B-1 is promising.

During the year under review, about 5,600,000 lbs. of pure seed of G. 6 was distributed over an area of about 3,50,000 acres ; the natural spread of seed covered another 19,000 acres. The entire crop was marketed, ginned and baled under Government supervision and it is estimated that the growers of G. 6 earned an extra income of Rs. 6,00,000. In addition, the extra profit to the cultivators on account of higher yield is estimated at Rs. 5,00,000.

(b) **Hyderabad Bollworm Clean-up Scheme.**—This scheme, which is the outcome of the investigation conducted on the bollworms of cotton during the years 1931-37, was sanctioned in August 1936, but, owing to administrative difficulties, it could not be put into operation until the 1st October, 1937. The object of the scheme is to demonstrate the efficacy and practical value of the following control measures against the Pink and Spotted bollworms in a compact area of about 400 square miles in Nanded district :—

(1) Removal of cotton plants as soon after the final picking as possible.

(2) Completion of ginning of all seed cotton before the 1st May of each year.

(3) Removal of alternative host plants and prohibition of cultivation of *bhindi* and *ambadi* in the off season.

The scheme closed down on 31st March, 1941. The research carried out at Parbhani has shown that the Pink and Spotted Bollworms are together responsible for a loss of 10 to 15 per cent of the annual crop, the newly developed, early maturing strains of *Gaorani* suffering markedly less than the existing commercial variety. The Spotted Bollworm passes from one cotton crop to the next by continuing to breed either on cotton plants left standing in the fields after the final picking, or on alternative host plants of *bhindi* (*Hibiscus esculentus*) and *ambadi* (*Hibiscus cannabinus*) grown as garden crops during this period. The Pink Bollworm either remains active on the standing cotton plants till the first week of May or goes into hibernation from October onwards. It has been found also that, unlike the case in the United Provinces, the Punjab and Egypt, very few larvæ of Pink Bollworm hibernate in seed. Most of the hibernating larvæ exist either amongst the fibres of *kapas* or in the cracks that are so characteristic of black cotton soils after the end of the rainy season.

Of the three seasons, during which the clean-up and other control measures were applied, the first two were definitely unfavourable for the development of the pest, whilst the last was quite favourable. As a result of intensive propaganda undertaken for the adoption of clean-up measures, cent per cent of the selected area was cleaned every year. It was, however, only in the third year of the scheme that the clean-up work was completed as early as the 15th March. The clearing was done by the *bakhar* or the blade harrow and the cultivation of *bhindi* and *ambadi* as irrigated crops from April to June was successfully prevented during the entire period of the campaign. The effect of

the clean-up measures was estimated by studying the extent of aestivation of Pink Bollworm in the soil and the incidence of bollworms on the succeeding cotton crop.

The study of the incidence of bollworms in the new crop gave the following results :—

(1) when the clean-up was done relatively early and the close season was of long duration, the bollworms appeared four to eight weeks later in the cleaned area than in the untreated area,

(2) the initial attack in the untreated area as compared with the cleaned area was three to six times greater in the case of Pink bollworm and four to ten times in that of Spotted bollworm,

(3) the attack of Spotted bollworm in the cleaned area remained lower throughout the season, but that of Pink bollworm gradually evened up with the attack in the untreated area as the season advanced,

(4) the percentage of clean, undamaged cotton was somewhat higher and of damaged and useless cotton slightly lower in the cleaned area than in the untreated area,

(5) the attack of pink bollworm was less in the early maturing cotton, *Gaorani 6*, than in the existing commercial variety. Correspondingly, the proportion of undamaged ripe cotton in *Gaorani 6* was higher.

These results indicate that the evil effects of boll-worm attack can be reduced perceptibly but that, to derive full benefit, the clean-up measures must be carried out extensively as soon after the final picking as possible.

In order to give effect to the results achieved under the scheme, the Hyderabad Agricultural Department proposes to issue instructions to the Revenue staff to ensure that the cultivators and the owners of fields carry out the prescribed measures. In addition to clean-up work, the following measures have been included in the propaganda programme of the State Department of Agriculture :—

(1) Completion of ginning of *kapas* before the 30th April, and

(2) Discouragement of the cultivation of *bhindi* and *ambadi*, as irrigated vegetables, during the period 15th April to 30th June.

A 'Comprehensive Pest Act,' providing for compulsory clean-up of cotton fields and the adoption of other control measures against the bollworms, is under the consideration of the State Government.

(c) Scheme for inclusion of Northerns and Westerns Cottons in Programme of work of Dry Farming Scheme at Raichur.—This scheme has a two-fold object, *viz.*, (1) to consider the possibility of growing medium and long staple cotton in short staple areas in India, and (2) to find out how far the devising of dry farming methods would go hand in hand with the successful growing of such cottons in the dry and low rainfall tracts of the country. It was sanctioned by the Committee in March 1937 and is due to terminate on 31st March, 1942.

The season, during the year, was characterised by excessive rainfall which amounted to 36.14" against the annual normal of 26". Heavy showers were received immediately after sowing and caused considerable damage to the young crop in some plots, vitiating the effect of the treatments. Sowings were done in rows, 24" apart, with a 9" distance between plants in the row. The work was carried out on the lines of the previous year. The following four experiments were under study :—

1. Manurial *cum* Varietal experiment,
2. Tillage experiment,
3. Bunding and Scooping experiment and
4. Observation plots.

Manurial cum Varietal experiment.—This was a complex experiment, involving three varieties, *viz.*, Hagari 1, Nandyal 14, and the Local and three treatments, *viz.*, oil-cake (groundnut), compost, and no manure ; the application of oil-cake and compost was on a nitrogen basis of 30 lbs. per acre. Manuring appeared to have the effect of hastening the maturity of the crop. The yield data showed that oil-cake gave a significant increase of 15% of seed cotton over the control, but no such advantage was noticed in favour of compost. N. 14 and H. 1 gave increased yields of 6.58% and 1.17%, respectively, over the local, but the results were not statistically significant.

Tillage experiment—This experiment was designed to test the effect of (*a*) deep-ploughirg with subsequent harrowings, (*b*) cultivation by tine-tooth cultivator only and (*c*) cultivation by blade harrowing only. Difierences during crop growth were not perceptible and final yields revealed that the increase noted in the case of treatments (*b*) and (*a*) over (*c*) were not significant.

Bunding and scooping experiments—The inclusion of 'Scooping' in the experiment was an additional treatment to 'Bunding' and 'No bunding' tried in the past year. Scooping was done simultaneously with bunding by working the Basin Lister, with the object of throwing the soil into a number of pockets for holding the rain water. This operation was repeated after each harrowing. Though the mean yield per acre was 607 lbs. of seed cotton, the treatments did not show any significant differences, probably due to loss of treatment-effect by the heavy rainfall received during the season.

Observation plots.—Eight varieties, including the local, were tried in duplicate plots. It was found that N. 14, notwithstanding late flowering, matured early; H. 1 and R.K. 15 proved to be earlier than either *Jayawant* or *New Jayawant*. As regards yields, H. 1 gave the best performance, closely followed by *Gadag 1*.

(d) Scheme for improvement of Kumpta Cotton.—This scheme was sanctioned for a period of five years and it came into operation in November 1937. The object of the scheme is to develop certain strains of *Kumpta* cotton bred from the local variety of Raichur which, in the preliminary tests conducted at the Government Experimental Farm, Raichur, before the sanctioning of the scheme, had given better yields of both seed-cotton and lint than either the local variety or improved *Jayawant*. After two years' work under the scheme, a strain known as Raichur *Kumpta 15* was selected for further development. It was sown in 1939-40 on an area of about 40 acres in a cultivator's field, and an average yield of 293 lbs. of seed cotton per acre was realised. Though this yield was a good deal better than the average yield of the local variety in the adjoining fields, the strain proved to be very susceptible to the wilt disease. The Committee, therefore, recommended that, on account of its wilt susceptibility, Raichur *Kumpta 15* should not be distributed, that Raichur *Kumpta 19* should be tested for its wilt susceptibility or resistance and that attempts should be made at once to produce a *Kumpta* type with wilt resistance. The work under the scheme in 1940-41, therefore, consisted of comparative trials of the most promising new strains, their parent variety and the imported types and a preliminary test in wilt-sick soil at Hanshihalhuda (a village about six miles from Raichur).

Of the new strains included in the varietal test at the Raichur Farm, Raichur *Kumpta 15* gave the highest yield, the difference in its favour being

statistically significant. It also out-yielded the local *Kumpta* as well as the imported variety, *Hagari*. Raichur *Kumpta 19*, unlike in the previous years, gave the lowest yield. The failure of Raichur *Kumpta 19* is ascribed to its late maturing habit, on account of which, it suffered the most from the long dry weather that characterised the year under review. In spinning performance, Raichur *Kumpta 15* showed a slight improvement over last year. Raichur *Kumpta 19* and the local variety maintained their previous position, while Hagari showed a distinct falling off.

Another yield trial with the three Raichur strains, the imported variety *Jayawant* and the local variety, was conducted at Kopbal in the south-east corner of Raichur District. As in the previous year, *Jayawant* gave significantly higher yield than any of the three Raichur strains. This supports the view expressed last year that the strains produced at Raichur for the central and eastern parts of the district are not likely to prove suitable for Kopbal area.

Several other strains of local Kumpta are reported to have given promising results at Raichur in a preliminary comparative test. The important ones amongst these are Raichur *Kumpta 21*, Raichur *Kumpta 32*, Raichur *Kumpta 36* and Raichur *Kumpta 37*. Raichur *Kumpta 15* and *27* also maintained their position, but Raichur *Kumpta 19* failed to do well in this experiment also. Amongst the imported varieties, *Nandyal 14* is reported to be the only one that gave a fairly high yield ; its ginning outturn, however, is distinctly lower than that of the local variety. The other imported types, *viz.*, *Hagari*, *Karunganni 1* and strain 19 gave markedly low yields.

The wilt tests carried out during the year showed that Raichur *Kumpta 19* Raichur *Kumpta 25* and the Poona type K. F. T. 12 are fairly resistant to the disease. There were, in addition, 24 progenies (twelve of which originated from Raichur *Kumpta 15*) which suffered much less mortality than the local variety. These will be studied further in the coming season.

By arrangement with the Deputy Director of Agriculture, Karnatak Division, comparative tests with the local variety, Raichur *Kumpta 15* and Raichur *Kumpta 19*, were carried out at six places. In these, Raichur *Kumpta 15* is said to have given the highest yield in two, and Raichur *Kumpta* 19 in three trials. It is proposed to repeat the experiments before either strain is recommended to the cultivators for extensive cultivation.

(x) BARODA.

(a) Baroda Root Rot Scheme.—This scheme which has for its object the study of the root rot disease of cotton in Baroda and the production of strains resistant to it, has been in operation since February 1932.

During the year under review, the presence of nematodes was observed in the interior and exterior of the affected roots. Sixty progenies of *Karkhadi* selections were tested under optimum conditions of infection in the glass house and forty-nine resistant plants were selected; these will be tested in the field next year. It was observed that the sowing of cotton alternated with other crops, such as, *bajri*, rice, *sann*, *variali* and *tur*, does not reduce the percentage of mortality due to the disease.

In the breeding section, 5 best plants from each of the 12 families of *Karkhadi* isolated from the general *Kharkhadi* bulk were tested in compact family blocks for resistance to root rot and yield, but statistical examination did not reveal any significant difference in the families. In the progeny row trial with 60 best *Karkhadi* plants, no significant differences were observed as regards mortality due to root rot. The percentage of mortality in these experiments was 23 against 96 suffered by Broach 9. Family 25, with 12% mortality, is reported to be the most promising of all the families tested. In the yield trials and spinning tests, *Karkhadi* selections again proved inferior to Broach 9. It is stated that attention, in future, will be concentrated on the isolation of highly resistant *Karkhadi* strains, with a view to using them as parents in crosses with other quality cottons.

A large number of varieties, both foreign and Indian, was tested for resistance to root rot, but none of them showed any promise. Several crosses were made between *Karkhadi* and *herbaceums*, such as 1027 A. L. F., Seg. 76-12 and Broach 9, and between *Karkhadi* and *arboreums*, like *Verum*, *Gaorani*, *Karunganni* and *Jarila*, but, due to unfavourable weather conditions, the percentage of success was small. The successful crosses will be tested in the ensuing year.

(b) Plant Puller Propaganda Scheme.—This scheme, which aims at the eradication of the Spotted Bollworm by the uprooting of cotton stalks by the use of the plant puller, came into operation on the 1st January, 1936, and terminated on the 30th June, 1941.

During the year under review, owing to the prevailing high prices of iron and the relatively smaller demand for plant pullers in Navsari, extensive

work in that district was not undertaken and only 691 pullers were sold. In Baroda district, the number of plant pullers sold was 4,906 and the area handled 281,250 acres. Six different leaflets, on the use and efficacy of plant pullers, were printed and distributed freely. Plant pulling competitions were arranged at suitable centres and it was demonstrated to the cultivators that the time taken to clean the fields with the pullers was not more than that required for digging them with *kudalis*. It was also demonstrated that the fields cleaned with pullers give higher yields than those cleared with *kudalis* (about 10% more on an average).

(c) **Scheme for improvement of Mathio cotton at Amreli.**—This scheme has for its object the improvement of *Mathio* mixture in respect of yield, ginning percentage and quality and the trial at Amreli of the early strains of *Wagad* evolved at Viramgam with a view to replacing, if possible, inferior *Mathio* by early *herbaceums*. The scheme came into operation in June 1937.

During the year under review, 10 *Mathio* selections were tested in randomised replicated progeny rows, with C. 520 and local as controls ; the results showed that No. 7 was significantly better in yield than all the other selections but its superior yield over C. 520 and local was not statistically significant. Out of another lot of 14 selections under trial during the season, three selections, *viz.*, Nos. 17, 18 and 19, were retained for inclusion in the varietal trial. This year's varietal test was carried out with two improved *neglectum* strains, *viz.*, *Banilla* and *Jarila*, three promising *Mathio* selections *viz.*, S. 10, S. 7, S. 9, two '*Bengals*' strains, *viz.*, C. 420 and C. 520, Khandesh, N. R. and local *Mathio*. None of the selections, including No. 7, was found to be superior to C. 520, either in respect of lint yield or staple length. The data collected during the last four years for *Jarila*, *Banilla* and Khandesh *N. R.* has shown that, in so far as quality and resistance to *Fusarium* wilt are concerned, *Jarila* is the best. It is, however, late maturing and is, therefore recommended for trial in areas where wilt is prominent or where the local *Mathio* ripens late, *e.g.*, Wankaner State and parts of Amreli. In respect of lint yield, C. 520 has given the best results.

(*xi*) BIKANER.

Bengals Cotton Improvement Scheme.—The opening of the Gang Canal under the Sutlej Valley Scheme resulted in the colonization of a new and virgin area, known as the Gang Canal area, with immigrant peasants, mostly

from the Punjab, who were accustomed to the cultivation of the Punjab *desi* and American types of cottton. These cultivators found it difficult to successfully cultivate cotton under local conditions, evidently because the new environment was not quite the same as they were accustomed to in the Punjab. This scheme, was therefore, started in January 1931, for the purpose of studying the local problems of the agriculturist and for obtaining by selection and hybridisation one or more superior types of cotton suitable to the locality. Until 1934, the botanical work was confined to the testing cut of a large number of outside varieties, both *desi* and American. After that year, however, extensive survey of the Rajputana tract was undertaken to collect breeding material; at the same time, extensive trials of the few selected cottons from outside were continued to test their suitability to the tract. Agronomic work was pursued intensively from the beginning of the scheme. At the end of the first five years, it was found that C. 520 was the most profitable cotton to grow in the tract and that the American cottons were generally unsuitable because of their low yield and susceptibility to disease. Also the staple of Punjab-American cottons was found to deteriorate both in length and strength when grown under Ganganagar conditions. A large amount of data and useful information regarding sowing times, seed rate, frequency and distribution of irrigation, optimum spacing for the *desi* and American cottons, rotation and manuring have been collected.

Since 1934, greater attention has been paid to selection and breeding problems; the results obtained so far are summarised below :—

(1) Re-selection in C. 520 has yielded strains which show much better germination possibly also a little higher yield than C. 520.

(2) Some of the local selections have proved better yielders than C. 520, but are poorer in quality.

(3) It appears doubtful whether mere selection would improve the quality of the *desi* cotton.

(4) Breeding tests have shown that there are possibilities of improving the quality by hybridization. As regards cottons that may be used as parents, the set C. 520 × *Bani* appears to offer the best chances of achieving the desired results.

(5) For the last two years P. A. 289F has done as well as C. 520 but it suffers from immaturity of the seed.

(6) In a variety *cum* agronomy experiment, interesting results have been obtained which show that the *desi* cotton (C. 520) can respond as well as the American to more favourable conditions —liberal watering and manuring, etc.

During the year selections from *Bengals* were again compared with C. 520 and *Sanguineum 119*; R. 18 proved to be superior to either of the latter strains in respect of yield, ginning percentage, fibre length and spinning value. It is considered, however, that R. 18 probably represents the limit of improvement by selection in the local material; further improvement will have to be looked for from hybridisation. Amongst the several, crosses in various stages of trial, those between *Bengals* and Shan material were observed to be the most promising. Of the three American varieties under test, P. 289F/43 was the earliest to mature; it was also the least affected by '*tirak*' and gave the highest return per acre. It is proposed to recommend this variety for cultivation in the Canal Colonies. The general impression that the seed obtained from the cotton crop grown in Ganganagar is unsatisfactory and that the required seed should be obtained from the Punjab annually is not borne out by experimental evidence. During the year under review, the response to manuring and irrigation was again studied, the varieties used being P. 289F/47 and C. 520. Heavier irrigations gave better stand, but the response to manuring was not appreciable.

(*xii*) MYSORE.

Mysore (Doddahathi) Cotton Scheme.—This scheme, which was sanctioned in 1935, is concerned with the breeding, from the local *Doddahathi* or American cotton, of suitable types, resistant to "red leaf" disease which stands in the way of the expansion of this crop in the Irwin Canal area in Mysore State. During the year under review, four varieties of cotton, *viz.*, M.A. II, Co. 3, Co. 4 and Co. 1267, were tested in randomised plots, with three different spacings (3′×1½′; 3′×3′; and 4′×3′) and three levels of nitrogen (ammonium sulphate at the rate of 251 lbs., 200 lbs. and 500 lbs. per acre). M.A. II was found to yield better than Co. 4 and the yield from 3′×1½′ spacing was significantly higher than that from the other spacings. The highest yield is reported to have been obtained from plots manured with 500 lbs. of ammonium

sulphate per acre. Another manurial trial confirmed the superiority of M.A. II over Co. 3 and Co. 4 in respect of yield. Manurial treatments with 50 and 100 lbs. of nitrogen per acre are stated to have given significantly better yields than the control. The same quantity of nitrogen when applied in four equal doses, instead of in a single dose, at the time of sowing, not only gave higher yields but also produced a greater number of healthy plants than the control plots. On the basis of yields obtained with the several treatments, it was found that 50 lbs. of nitrogen applied in four equal doses was more remunerative than the other treatments.

At the Hebbal farm, under rainfed conditions, M.A. II gave significantly higher yield than local *Doddahathi*, Gadag I and Co. 3; Co. 4 recorded significantly better yields than Gadag I and Co. 3.

Amongst the several hybrid populations under study, F3 of crosses of *G. purpurascens* with M.A. II and Co. 2 appeared to be promising.

M.A. II is reported to be gaining in popularity in the rainfed tracts of Banavar, Arsikere, Closepet, Hunsur, Chennapatna and Chitaldrug *taluks* and seed of this strain, sufficient to cover 3,000 acres, was distributed in these *taluks*. Seed of Co. 4 is being distributed free for cultivation over a large area brought under irrigation by the newly formed branches of the Irwin Canal in Maddur, Malavalli and Mandya *taluks*.

CHAPTER IV.

SEED DISTRIBUTION AND EXTENSION SCHEMES.

For a considerable period, the Committee restricted its grants to agricultural research, but in 1929 it was decided that the time had come to add its support to the efforts already being made to bridge the gap between the experiment station and the cultivator, and to supplement the funds which the Agricultural Departments were devoting to the introduction of improvements into agricultural practice. Special attention has since been devoted to seed distribution schemes, and to the more extended distribution of pure seed of improved varieties of cotton. During the period under review, there were seventeen seed distribution and extension schemes in operation in the various cotton growing provinces and States ; a brief report on the working of these schemes is given below :—

1. BOMBAY.

(a) Surat Seed Distribution Scheme.—This scheme was first sanctioned in November 1929 for a period of two years. In December 1931, it was extended for another two years, pending the final decision of the Committee on the cotton policy to be adopted in the Surat area ; in January 1934, after a thorough examination of the relative merits of 1A and 1027 A.L.F., the Committee decided in favour of the latter and extended the scheme for the distribution of 1027 A.L.F. seed in the Surat area.

During the year under report, the Agricultural Department controlled a seed multiplication area of 20,640 acres (including 1,094 acres grown with farm pedigree seed), against 17,874 acres (including 1,687 acres with farm pedigree seed) last year. 23,68,355 lbs. of seed were distributed (16,74,755 lbs. in British areas and 6,93,600 lbs. in Rajpipla State) against 22,73,633 lbs. (15,95,061 lbs. in British areas and 6,78,572 lbs. in Indian States) in the previous year.

Inspection and survey of the cotton area in Surat are reported to have revealed that Selection 1A has spread considerably in Surat and South Surat area and that the general tendency of the cultivators is to grow Selection 1A, either pure or as a mixture, in preference to pure 1027 ; further that the 1027 A.L.F. cotton area, which was formerly assumed to be pure, is now getting

mixed with inferior high ginning varieties. The uncontrolled area shows appreciable mixture with such varieties and many growers are said deliberately to mix up seed supplied for cultivation even in the controlled area. The difficulty experienced in the sale of pure 1027 A.L.F. cotton at remunerative prices is stated to have created an unfavourable atmosphere for the future expansion of this cotton.

During the year, guaranteed pure 1027 A.L.F. was sold under two AGMARK labels—red for " pedigree " cotton and black for " certified " cotton. It is reported, however, that Agmarked 1027 did not fetch any higher premium than that obtained in the past years when no ' AGMARK ' was applied. 559 bales of " pedigree " (AGMARK red label) cotton and 4,025 bales of ' certified ' (AGMARK black label) cotton were sold at premium of Rs. 6 to Rs. 22. Owing to the absence of ready demand, some of the bales of 1027 had to be sent to Bombay in tender.

The following table gives the comparative figures of yield, ginning percentage and price of 1027 A.L.F. and Selection 1A :—

Name of Variety.	Yield of seed cotton per acre in lbs.	Ginning percentage.	Yield of lint per acre in lbs.	Price of lint per candy. (800 lbs.)	Price of lint yield per acre.
				Rs.	Rs.
1027 A. L. F.	360	33.3	120	320	48
Selection 1A	400	37	148	295	54/9

The table shows that the grower of 1027 A.L.F. gets Rs. 6-9-0 less per acre than the grower of Selection 1A. The position indicated above is reported to have been in existence for the last five years, and it is stated that the continuance of the policy to favour 1027 in the Surat area can only be justified if an appreciable premium can be obtained for this variety over a number of years and under varying market conditions, to compensate for the reduced outturn per acre of *kapas* and lint compared with Selection 1A.

(b) Scheme for control of Selection 1A cotton.—This scheme was sanctioned in November 1938, for a period of three years, subject to the condition that it should come into operation only if and after the Government of Bombay had isolated Olpad and part of Chorasi Taluka, and that it should continue only so

long as this area was effectively isolated. On the fulfilment of this condition, the scheme came into operation in February 1940. The objects of the scheme are (1) to confine the growth of 1A, as far as possible, to Olpad Taluka, by restricting the movement of cotton and cotton seed out of that area and by making provision for pure seed of Selection 1A for cultivation within the Taluka area, and (2) to check the cultivation of 1A in the rest of the Surat area by arranging for the distribution of adequate quantities of pure seed of 1027 A.L.F. and by intensive propaganda against Selection 1A. Since the commencement of the scheme, 10 check stations (4 on the Tapti river and 6 on the Kim river) were established to prevent illicit import of cotton by road from Olpad to the Surat and Ankleshwar areas. Ginned cotton was allowed, under licence, to be transported to Surat for being pressed and marked " OL-PAD " before sale. The work was supervised by the Agricultural Overseer and 20,172 bales in 1940 and 15,380 bales in 1941 (up to the end of May 1941) were thus marked.

A survey made between December 1940 and May 1941, with the object of estimating the extent of the spread of 1A cotton in the Surat and South Surat areas, revealed that, in Chorasi Taluka, 15 out of 46 villages grew Selection 1A and the rest either 1027 A.L.F. or local; in other talukas, Selection 1A was grown in all the villages to the extent of 30% to 100%. It was further observed that Selection 1A itself contained a mixture of other varieties to the extent of 30%. An analysis of the prices obtained for pure 1027 A.L.F. and pure Selection 1A showed that pure 1027 realised, in 1940, a premium of Rs. 14 to Rs. 20 over local and Rs. 20 to Rs. 22 over Selection 1A, and in 1941, a premium of Rs. 13 to Rs. 18 over local and Rs. 17 to Rs. 23 over Selection 1A (marked OLPAD). The difference in price between pure 1027 and pure 1A is, however, considered quite inadequate to make up for the lower yield and ginning outturn of 1027 A.L.F. and it is reported that as a result, 1A is gaining favour with the growers.

(c) **Jarila Seed Distribution and Extension Scheme.**—This scheme was sanctioned in March 1937 for a period of ten months in the first instance. It was extended in January 1938 for a period of one year, in November 1938 for three years and again in July 1941 for a further period of five years. Its original object was to replace *Banilla* in the Khandesh tract with *Jarila*, which is wilt resistant, over an area of some 1,55,000 acres. In view, however, of the general suitability of *Jarila* for the Khandesh area, the expansion now aimed at is 8,00,000 acres, out of a total cotton area of 11,00,000.

The scheme is operated in five stages of which the first two are the Government Farms at Jalgaon and Bhadgaon. The seed produced at the Jalgaon Farm is used for further multiplication in the wilt affected regions, and that at Bhadgaon Farm for the wilt free zone of Khandesh.

Stages I and II.—During the year under report, 4,653 lbs. of seed were produced from the Farm area. These will be multiplied in 1941-42 over an area of 100 acres in Stage II. 32,660 lbs. of seed from Stage II were handed over to the Cotton Superintendent, Jalgaon, for further multiplication in Stage III. All the cotton produced in Stages I and II was ginned in the Farm gin and sold at a premium of about Rs. 25 to Rs. 30 '*ON*' Broach and Rs. 53 to Rs. 58 '*ON*' Oomra.

Stages III, IV and V.—During the year, 5,26,116 lbs. of seed, sufficient to cover 26,236 acres, were distributed. The natural spread is estimated at 1,73,334 acres, bringing the total area under *Jarila* to 2,00,000 acres, against 6,00,000 acres proposed to be covered under the scheme. It is stated that arrangements have been made for stocking 9,08,180 lbs. of *Jarila* seed, sufficient for 48,860 acres. The total area expected to be covered under controlled seed of *Jarila* in 1941-42 is 1,90,000 acres.

The cotton from the fields of the registered seed growers was ginned under departmental supervision and 1,097 bales were sold by auction at a premium of Rs. 35 and Rs. 62 per *candy* over Broach and local respectively.

(d) **Deccan Canals (Banilla) Seed Distribution Scheme.**—This scheme was sanctioned in January 1934 for a period of five years and came into operation in April 1934. In August 1939, a further extension for five years was sanctioned. The object of the scheme is to distribute seed of *Banilla* to enhance general cotton yields and to improve the quality of the cotton in the Deccan Canals tract in the Poona, Sholapur and Ahmednagar districts.

As the crop did not grow well during 1939-40 at the Kopergaon Farm, the venue of seed multiplication was changed and organised on new lines in the Baramati tract. An average yield of 1,000 lbs. of seed cotton was obtained in this tract, against 200-300 lbs. at Kopergaon last year. 3,500 lbs. of pedigree seed were supplied to the cultivators and grown on 300 acres of land in the villages of Sansar, Lasurne, Kanneri, Tawshi, Udhat, etc. From the seed available, 18,600 lbs. of pedigree seed, of 80% viability, were obtained and supplied to the cultivators. The area under *Banilla* was 7,300

acres, which is 33% of the area (21,000 acres) proposed to be covered with this variety. The enhanced value obtained by growing *Banilla* was estimated to be about Rs. 10 per acre.

(e) **B. D. 8 Seed Distribution Scheme.**—This scheme, which has for its object the distribution and extension of B. D. 8 cotton in the Broach cotton growing tract of the Bombay Province, was sanctioned in August 1935, for a period of three years, and came into operation in December 1935. It was extended, in July 1938, for a period of five years. During the year under report, the total area under B. D. 8 cotton in Broach district (excluding Ankleshwar taluka) was 9,728 acres, against 30,951 acres last year. The low acreage was due to its failure to obtain proper premium in the previous year. The Agricultural Department controlled 4,156 acres for seed multiplication, including 1,124 acres grown with pedigree seed from the Government Farm, Broach. 107,480 lbs. of seed of B. D. 8 (7,920 lbs. of pedigree seed and 99,560 lbs. from the inner reserved area) have been purchased for distribution in the coming season. In addition, 53,760 lbs., of seed from the inner reserved area have been supplied to cultivators in Kaira and Panch Mahals districts. B. D. 8 cotton was ginned under Departmental supervision and 691 bales from the controlled area were sold at a premium of Rs. 85 to Rs. 132 'ON' Broach, against the premium of Rs. 20 to Rs. 39 'ON' Broach obtained last year. The gross extra income to the growers of B. D. 8 cotton is estimated at Rs. 23,104.

Segregates, 1-2 and 1-6, evolved on the Broach Farm, are reported to have given very promising results during the year and it is expected that they may replace B. D. 8 in the near future.

(f) **Revised Jayawant and Gadag No. 1 Seed Distribution Scheme.**—This scheme, which was sanctioned in August 1935, for a period of five years, replaced five seed schemes in the Southern Division of the Bombay Province, *viz.*, the Hubli, Gadag, Athani, Haveri and Bailhongal schemes. It came into operation on the 1st June, 1936 ; in August 1940, it was extended for a period of one year and again in July 1941 for a further period of four years from 1st June 1942. The object of the scheme is to eliminate local mixtures and to introduce pure *Jayawant* and *Gadag No. 1* cottons in the Southern Division of the Bombay Province, so as to cover within five years, 9½ lakhs of acres. The scheme is operated from seven centres, *viz.*, Hubli, Haveri, Navalgund, Bailhongal, Athani, Bijapur and Bagalkot, through the agency of co-operative

societies, under the general control of the Agricultural Department. Decentralisation is the keynote of the scheme, the idea being that no single agency should have too great an area to cover or too great a responsibility to shoulder.

JAYAWANT COTTON.—It is proposed to cover, within five years, an area of 7.75 lakhs acres in Dharwar, Belgaum and Bijapur districts and a part of Satara district. During the year under report, 68,908 acres of the reserved area were rogued and the produce was stocked separately and sold by auction. Out of 63,79,025 lbs. of seed stocked, 48,51,330 lbs. were sold for sowing purposes. The area under pure *Jayawant* was 5,55,544 acres, and the natural spread was estimated at 1,50,000 acres, bringing the total area to 7,05,544 acres, against 7,79,000 acres last year. The decrease in acreage is attributed to untimely rains. The cultivators' produce was pooled and sold by auction at different centres. 21,953 *dokras** of cotton were sold at a premium of Rs. 9 to Rs. 18 per *naga*† over local. The extra profit realised by the cultivators by growing *Jayawant* is estimated at Rs. 10,50,000. With a view to covering an area of 7,67,000 acres with *Jayawant*, it is proposed to stock 78,38,600 lbs. of seed, of which, 47,49,920 lbs. have already been purchased.

GADAG NO. 1 COTTON.—The objective aimed at is to cover, within five years, an area of 1.75 lakhs acres in Dharwar district. During the year, a reserved area of 25,181 acres was rogued. 16,00,900 lbs. of pure *Gadag No. 1* seed were stocked, of which 15,14,800 lbs. were distributed for sowing over an area of 1,51,480 acres, against 14,08,400 lbs. of seed and an area of 1,33,515 acres in the previous year. The natural spread of this variety is estimated at 30,000 acres, making a total of 1,81,480 acres, against 1,59,000 acres in the previous year. 19,799 *dokras* of cotton have so far been sold by auction at a premium of Rs. 5 per *naga* over local. The extra profit realised by the cultivators by growing this variety is estimated at Rs. 3,78,080, excluding an extra gain of Rs. 25,000 due to sales effected through auction. With a view to covering the stipulated area of 1,72,200 acres, it is proposed to stock 18,00,000 lbs. of *Gadag No. 1* seed, of which 14,27,200 lbs. have already been purchased.

(g) **Scheme for maintenance of nucleus of pure seed of improved varieties of cotton.**—In pursuance of the policy of the Committee that a nucleus of seed

* Weight variable, usually about 330/400 lbs. † 1,344 lbs.

of all approved varieties of cotton should be maintained, a scheme for the maintenance of a nucleus of each of the following seven varieties of cotton was sanctioned in August 1937, for a period of five years :—

(1) 1027 A. L. F.
(2) B. D. 8.
(3) *Jarila* (Bhadgaon).
(4) *Jarila* (Jalgaon).
(5) *Jayawant.*
(6) *Gadag No. 1.*
(7) *Banilla.*

The total area selfed and the quantity of selfed seed of each variety produced during the year are given below :—

Name of Variety.	Area selfed.		Amount of selfed seed produced. lbs.	Remarks.
	Acres.	Gunthas		
(1) 1027 A. L. F.	1	36	350	Selfed larger area than one acre to take full advantage of short period of boll formation.
(2) B. D. 8	1	0	118	Poor yield due to adverse weather conditions. 89 lbs. of open fertilised seeds also produced. All the seed has been supplied to the Broach B. D. 8 Seed Distribution Scheme.
(3) *Jarila* (Bhadgaon) ..	1	0	307	
(4) *Jarila* (Jalgaon)	1	0	200	Seeds used for Jalgaon Farm.
(5) *Banilla*	1	0	191	
(6) *Jayawant*	2	0	292	Low yield due to continuous rain. 140 lbs. handed over to the Superintendent, Dharwar Farm. 100 lbs. to the Managing Director Cotton Sale Society, Hubli.
(7) *Gadag No.* 1	2	0	289	Low yield due to red leaf blight. 160 lbs. used for sowing on 16 acres at Gadag, 129 lbs. handed over to the Cotton Overseer, Gadag.

2. SIND.

(a) **Sind Seed Distribution and Extension Scheme.**—This scheme was sanctioned in December 1930 for a period of three years and came into operation in April 1931.

The main objects of the scheme are :—

(*a*) Varietal tests of improved strains—Sind American cottons.

(*b*) Trials of high quality cottons—Egyptian and imported American cottons.

(*c*) Demonstration of cotton cultivation on non-cotton growing areas on new barrage lands.

(*d*) Seed multiplication, distribution and extension work.

(*e*) Propaganda, demonstration and advisory work in connection with the extension of improved varieties of cotton and better methods of cultivation.

(*f*) Assistance to cotton growers in marketing cotton.

The work on the Right Bank is mainly concerned with the extension of cotton cultivation, while on the Left Bank, attention is largely devoted to seed multiplication and distribution of improved varieties of cotton and the introduction of better methods of cultivation.

During the year under report, there were 5,17,000 acres under improved varieties, representing 57·1% of the area under cotton in Sind, against 4,67,000 acres, in the previous year, representing 54·6% of the Sind cotton area. The total area under cotton, in the newly developed cotton tracts, was 1,02,000 acres, against 90,000 acres last year, and 1,05,500 acres in 1938-39. Eight thousand six hundred maunds of 4F-98, 34,701½ maunds of Sind *Sudhar* and 11,802½ maunds of Sind N.R. were distributed during the year, against 7,293 maunds of 4F-98, 33,190 maunds of Sind *Sudhar* and 8,214 maunds of Sind N.R. distributed in the previous year. About 8,000 maunds of seed of 4F-98, 40,000 maunds of Sind *Sudhar* and 16,000 maunds of Sind N.R. will be available for distribution in 1941-42. The average yield of *kapas* per acre was estimated at 8 maunds, and it is reckoned that the cotton growers realised Rs. 8 and Rs. 7-8 per maund of *kapas*, respectively, for Sind *Sudhar* and 4F-98, and Rs. 4-8 per maund for *desi* cotton. Sind *Sudhar* fetched a premium of Rs. 140 'on' Broach. The extra gross income to growers of improved varieties is estimated at Rs. 23,06,875.

(b) Scheme for maintenance of nucleus of pure seed of improved varieties of cotton.—In pursuance of the policy of the Committee for the maintenance of a nucleus of seed of all varieties of cotton, the spread of which has been approved by it, a nucleus scheme for the following three varieties of cotton was sanctioned in August 1937 for a period of five years: —

1. Sind N. R.
2. Sind *Sudhar*.
3. 4F-98.

The scheme came into operation in April 1938. In accordance with the decision of the Committee in August 1940, the maintenance of nucleus of Sea Island *2-4* and Boss III-16 has been transferred to the scheme for the production of long staple cottons in Sind.

The total area selfed and the amount of selfed seed produced in 1940-41 as well as the area sown in 1941-42 under each variety are shown below :—

Name of variety.	Area selfed in 1940-41.		Selfed seed required.	Selfed seed produced.	Area sown with selfed seed in 1941-42.	
	Acres.	Gunthas.	lbs.	lbs.	Acres.	Gunthas.
Sind N. R. ..	1	10	250	420	9	26
Sind *Sudhar* ..	2	20	575	218	10	0
4F-98	1	10	325	178	8	0

(c) Financing of Seed Distribution.—In January 1938, a scheme for the financing of seed distribution in Sind was sanctioned by the Committee for a period of three years, subject to the condition that it would not be put into operation until the rules under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, have been brought into force. The scheme was not put into operation during the year under report.

3. CENTRAL PROVINCES AND BERAR.

(a) Verum Seed Distribution and Marketing Scheme.—In November 1929, the Committee sanctioned, for a period of one year in the first instance, the Central Provinces *Verum* Seed Distribution and Extension Scheme. It started work in September 1930 and was extended annually up to the end of July 1934,

when it was combined with the newly sanctioned scheme for the extension of long staple cottons in the Central Provinces. The combined scheme, known as "Scheme for Extension of Long Staple Cotton and Marketing of *Verum* Cotton in the Central Provinces and Berar" was sanctioned for five years from June 1934. At the meeting of the Committee, held in July 1938, it was extended up to the 31st May 1941, the title being changed to "Scheme for the Extension and Marketing of V. 434 Cotton." In January 1941, a further extension up to 29th February 1944, was sanctioned. The scheme aims at the expansion of area under V. 434 cotton in the seven taluqs where *Verum* has made most headway in the past, the ultimate object being to eliminate all other varieties as far as possible. During the extension period, the objective will be to raise the area in six of the seven taluqs (excluding Ellichpur) to 5 lakhs of acres.

The working of this scheme has been very stisfactory and the five-fold increase aimed at in the past two seasons has been much exceeded. In 1938-39 the area under V. 434 in the seven taluqs referred to above was 25,000 acres and it rose to 86,000 acres in 1939-40 and 2·18 lakhs of acres in 1940-41. Over 30,000 maunds of seed were distributed in the seven taluqs in 1940-41, through departmental and other co-operating agencies. In addition, 6,264 maunds of seed were distributed over an area of 28,000 acres outside the selected taluqs, where the natural spread of the cotton is estimated at 25,000 acres. The total area under V. 434 in the Provinces during the year under review was estimated at 2,71,600 acres. 61,167 maunds of pure seed, ginned at the pooling centres, will be utilised for sowing in the next season. The area proposed to be covered during 1941-42, according to the programme, is 3,50,000 acres.

The total number of bales sold through the departmental pool amounted to 7,065½, out of which, 6,721 bales were of V. 434 the special areas contributing 5,201 bales. The average premium obtained was Rs. 42-13 'on' Broach and Rs. 76 'on' Oomras. It is estimated that the total quantity of *Verum* produced in the Provinces was some 68,500 bales. The total extra income derived by the growers of V. 434 during the year was estimated at nearly Rs. 14,71,000.

(b) Scheme for Distribution and Marketing of Buri 107 cotton.—This scheme was sanctioned by the Committee in July 1938, for a period of three years, and came into operation on the 1st November, 1938. In January 1941, it was extended up to 29th February, 1944. The object of the scheme

is to introduce *Buri 107*—a selection from acclimatised *Gossypium hirsutum* developed under the Central Provinces Botanical Research Scheme—in Burhanpur Tahsil of Nimar district, where the total area under cotton is about 75,000 acres. Commencing with an area of 2,000 acres in 1938-39, the programme was to raise the area under this cotton to 10,000 acres in 1939-40 and 30,000 acres in 1940-41. During the extension period, the aim will be to raise the area to 50,000 acres and to maintain it at that figure. This is likely to be the limit of extension, as the balance of the cotton area in the tahsil is not considered suitable for American cotton.

The working of this scheme has been very satisfactory and the objective of covering 30,000 acres in 1940-41 has been achieved, the area under departmental and natural spread combined being 33,800 acres. As the cultivators could not be induced to pool their cotton through the departmental agency, arrangements were made with local merchants to gin *Buri 107 kapas* of approved purity separately and to supply the seed to the Agricultural Department for distribution in 1941. 7,400 maunds of seed, sufficient for 31,800 acres, were then purchased by the Department, but this seed was believed to contain about 2% *Jari* mixture. In addition to the above quantity, 296 maunds of seed of certified purity are available for covering an area of 1,800 acres. Thus, the area proposed to be covered in 1941, under departmental seed, is 33,600 acres.

(c) **Maintenance of nucleus of pure seed of improved strains of cotton.**—This scheme for the maintenance of nucleus of pure seed for each of the cotton strains, V. 434, *Late Verum*, No. 438 and *Buri 107*, was sanctioned by the Committee in July 1938, for a period of five years from April 1939. The following table shows the quantity of selfed seed proposed to be produced under the scheme and the quantity actually obtained :—

Strain.	Selfed seed proposed to be produced per acre.	Selfed seed produced.
	lbs.	lbs.
V. 434	200	352
Late Verum	200	314
No. 438	200	347
Buri 107	200	244

4. MADRAS.

(a) **Madras Co. 2 Seed Distribution Scheme.**—This scheme was sanctioned by the Committee in August 1932, for a period of five years, for the distribution of Co. 2 seed in the Salem and Coimbatore districts through the agency of the Tiruppur Co-operative Trading Society, by organising a seed multiplication area of not less than 6,000 acres and distributing enough pure seed for 1,00,000 acres every year. The scheme closed down on the 17th August, 1937. In January 1938, the Committee considered proposals for the extension of the scheme, but sanctioned a grant for one demonstrator and one *maistry* to help the Tiruppur Co-operative Trading Society for a period of one year, after which, it was thought that no further assistance from the Committee should be required. In November 1938, the Committee extended the scheme for the distribution of Co. 2 seed in Salem district for a further period of four years and five months. The Madras Government have, however, postponed the operation of the scheme.

(b) **Maintenance of nucleus of pure seed of improved varieties of cotton, Co. 2, H. 1. and K. 1.**—This scheme was sanctioned by the Committee in January 1938 for a period of five years and came into operation in September 1938. The area selfed and the quantity of selfed seed of each variety produced during the year are given below :—

Name of variety.	Area selfed. Acres.	Amount of selfed seed produced. lbs.	How disposed of.
Co. 2.	1.0	710	Transferred to the District Agricultural Officer, Coimbatore.
H. 1	2.5	280	Used for sowing bulk area of Agricultural Research Station, Hagari.
K. 1	2.0	517	Reserved for sowing in Agricultural Research Station, Koilpatti.

5. HYDERABAD STATE.

A Seed Distribution Scheme for the Hyderabad State was sanctioned in November 1929 for three years in the first instance and came into operation in March 1930. It was extended, in February 1933, for three years and again in January 1936, for another six months. In August 1936, it was extended for a further period of 4½ years from the 1st September, 1936. The object of the scheme is to introduce improved strains of cotton in the Raichur District and to market the crop under favourable conditions so as to secure a better premium for the cultivator. During the first two years of the scheme, seeds of *Dharwar No. 1* and *Gadag No. 1* were distributed, but as a result of the experiments conducted by the Hyderabad and Bombay Agricultural Departments, the distribution of *Dharwar No. 1* seed was discontinued in favour of *Jayawant* which was found to be more suitable.

During the year under report, *Jayawant* was the only variety distributed. The following statement shows the progress made in the distribution of seed since the commencement of the scheme and the area covered through departmental effort and by natural spread :—

Year.	Variety of seed distributed.	Quantity of seed distributed in lbs.	Approximate acreage sown with departmentally distributed seed.	Area under natural spread in acres.	Total acreage.
1930-31 ..	Dharwar No. 1 & Gadag No. 1	2,53,068	21,000	..	21,000
1931-32 ..	*Jayawant* and Gadag No. 1	2,56,670	11,300	15,000	26,300
1932-33 ..	Do. do. ..	3,41,456	18,926	30,000	48,926
1933-34 ..	Do. do. ..	3,29,017	17,000	45,000	62,000
1934-35 ..	Do. do. ..	4,87,781	6,370	15,000	21,370
1935-36 ..	Do. do. ..	5,53,880	41,256	15,000	56,256
1936-37 ..	Do. do. ..	3,74,633	13,871	20,000	33,871
1937-38 ..	Do. do. ..	2,63,945	21,092	16,000	37,092
1938-39 ..	Do. do. ..	2,57,438	22,007	30,000	52,007
1939-40 ..	Do. do. ..	4,49,089	35,000	37,000	72,000
1940-41 ..	Jayawant	5,69,220	45,386	86,329	1,31,715

It will be seen that, out of a total area of 1,80,000 acres (80,000 acres in the Raichur protected area and 1,00,000 acres in the unprotected area adjoining Raichur area) proposed to be covered under the scheme, an area of 1,31,715 acres or 73% of the proposed total was covered by 1940-41.

The Kopbal Co-operative Cotton Sale Society continued to co-operate with the Agricultural Department in the production and sale of pure seed and the holding of auction sales. The price realised for *Jayawant* during 1940-41 at Kopbal was Rs. 50 "ON" Broach, which is the same as that offered in the markets of Gadag and Bellary. The gross extra income to the growers of the improved variety is estimated at Rs. 2,70,015.

With a view to bringing an area of 1,80,000 acres under *Jayawant* cotton, the Agricultural Department has approached the State for an extension of the scheme for a further period of 2½ years and in anticipation of the proposal being sanctioned, arrangements have been made to obtain 5,00,000 lbs. of seed sufficient for 40,000 acres.

6. BARODA STATE.

(a) **Baroda (Navsari) Seed Storage Scheme.**—This scheme is concerned with the spread of 1027 A. L. F. in the Navsari district of the Baroda State. It was sanctioned in February 1933, for a period of five years, subject to the condition that the Baroda Government would arrange a seed multiplication area of 1,000 to 2,000 acres in that district. At the meeting of the Committee in July 1938, the scheme was extended for a further period of five years from 1st April, 1939.

During the year under report the total area under 1027 A. L. F. was estimated at 80,000 acres of which the area controlled and certified was 34,645 acres. The corresponding figures for the previous year were 75,000 acres and 25,834 acres, respectively. 37,778 lbs. of 'A' grade seed, 2,36,661 lbs. of 'B' grade seed and 2,83,721 lbs. of 'C' grade seed were distributed. To meet the demand for seed in the ensuing year, 26,96,925 lbs. have been purchased and stored.

20 lbs. of seed, supplied by the Cotton Breeder, Surat, were sown on an area of 2½ acres in the Vesma Farm, and 834 lbs. of seed produced will be sown next season in the nucleus seed area of 88 acres on the Farm. Last year this area yielded 30,760 lbs. of pedigree seed which will be given to 'A' grade growers for sowing in 1941-42.

The produce of the improved variety was ginned and baled under departmental supervision and stamped with 'AGMARK.' 5,198 bales were sold at a premium of Rs. 7 to Rs. 19 per *candy*, against 6,745 bales, sold last year, at a premium of Rs. 5 to Rs. 20 per *candy*. A notable feature of the year was that 1027 A. L. F. grown in Navsari district fetched a premium of Rs. 132 'ON' Broach; in the past the premium never exceeded Rs. 65 'ON.'

With effect from the 17th April 1941, the cultivation, except under licence, of any variety of cotton other than 1027 A. L. F. is prohibited under the Baroda Cotton Control Act.

(b) Baroda B. D. 8 Seed Distribution Scheme.—This scheme, which has for its object the extension of B. D. 8 cotton in Baroda District, was sanctioned in July 1938 for a period of five years and came into operation on the 1st April 1939. Its object is to popularise B. D. 8 cotton (which is wilt-resistant and superior in quality to the local cottons) over 51,000 acres of the *Kahnam* black soil area of the Baroda district, north of the river Nerbudda.

During the year under report, 19,240 lbs. 'A' grade seed, 60,560 lbs. 'B' grade seed and 68,040 lbs. 'C' grade seed were stocked at four depots, but, owing to inadequate premium during the previous year and prejudice against this variety amongst dealers on account of its low ginning percentage, the area sown was only 6,107 acres, against 7,680 acres in the previous year. Arrangements for nucleus seed were made by growing selfed seed, supplied by the Bombay Agricultural Department, on an area of 73 acres on the Dabhoi Farm. Owing, however, to unfavourable distribution of rainfall during the season, the yields obtained in many cases were very low; against an expected produce of 1,371 *bhars* of seed cotton, only 736 *bhars* were collected and 493 bales are reported to have been pressed from this produce so far. Of these, 99 fully pressed bales were sold at Rs. 85 'ON' F. O. R. Dabhoi. One firm paid a premium of Rs. 10 to Rs. 12 per *bhar*. Though low premium during the last year, poor yields in the current year and low ginning percentage have proved to be serious handicaps to the rapid spread of B. D. 8, in the hope that the next season would be more favourable, 9,960 lbs. of 'A' grade seed sufficient for 600 acres, 86,400 lbs. of 'B' grade seed sufficient for 5,000 acres and 1,76,640 lbs. of 'C' grade seed sufficient for 6,000 acres, have been stocked for distribution in 1941-42.

Apart from this scheme, the Baroda Government organised seed multiplication over an area of 479 acres at Karjan, and 154 bales of B. D. 8 were produced and sold at Rs. 189 to Rs. 194 per *candy* F. O. R. Bombay.

Since 1929, the undermentioned Seed Distribution and Extension Schemes, financed by the Committee, have closed down after completion of their sanctioned period or for other reasons. The work done under these schemes has been reviewed in previous reports :—

Madras Province :—

(1) Madras (Tiruppur) Seed Extension Scheme.

Bombay Province :—

(2) Hubli.

(3) Gadag.

(4) Gadag Supplementary.

(5) Athani.

(6) Khandesh (*Banilla*).

United Provinces :—

(7) C. 402.

Punjab :—

(8) Lyallpur (Ginnery).

CHAPTER V.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON.

Advance in the cotton growing industry of India is closely associated with advance in the Indian cotton mill industry. The Indian mills today consume a quantity of cotton about equivalent to three-fifths of India's total produce and the moiety that they consume is, in the main, the better staple cotton. There is practically nothing to spare of the types of Indian cotton they most require. If India's mills are going to expand, spinning in her own country cotton of her own growing, then it is vital that India's mills shall have the cotton with which to do it. The Committee realises the importance of these things and that is the chief reason why the improvement of the quality has figured so prominently in its programme. The war has brought the problem of the short staple cotton to the forefront, and the Committee's policy of aiming at a better balance of medium and short staple types has been amply justified. It is to be admitted, however, that only a fringe of the problem has so far been touched and much ground still remains to be covered. The following paragraphs, which give a brief account of the progress made in the introduction of improved varieties of cotton in the various cotton-growing Provinces and States of India as a result of the joint efforts of the Indian Central Cotton Committee and the Provincial Departments of Agriculture, indicate the present position :—

BOMBAY.

The total area under cotton in the Bombay Province, including Indian States except Baroda, was 5,478,000 acres, of which the improved varieties constituted roughly 1,405,000 acres or 26% of the total. The position with regard to the various cotton growing tracts is indicated below ; the figures in brackets after each tract refer to the area under cotton in the tract in 1940-41 :—

Kumpta and Upland tract (including Bijapur District, 454,000 acres) (923,000 acres).—Two important varieties, *viz.*, *Jayawant* and *Gadag 1* are grown in this tract which comprises the districts of Dharwar, Belgaum, Satara and Satara Jagirs and S. M. C. States. *Jayawant* is an isolate from a cross

between *Dharwar I* and *Dharwar II*—two selections from local *Kumpta* cotton. It has a ginning percentage of 28 and a staple length of 15/16" and is capable of spinning up to 26's to 30's warp. Moreover, it is highly wilt-resistant under field conditions and combines all the good characters of the parents. *Gadag 1* is a selection from the local Dharwar American cotton; it has a ginning percentage of 33, a staple of $\frac{7}{8}$" and a spinning capacity of 24's/30's warp. The chief centres of distribution of *Jayawant* are Hubli, Navalgund and Haveri in Dharwar District; Bailhongal and Athani in Belgaum District; and Walva and Tasgaon taluqs in Satara District. *Gadag 1* is chiefly grown in the Gadag and Ron taluqs of Dharwar District. The area under *Jayawant* and *Gadag 1* in this tract (including *Jayawant* grown in Bijapur District) during the year was about 706,000 and 181,000 acres, respectively. In other words, roughly 65 per cent. of the tract, including Bijapur District, was covered by improved strains.

Barsi-Nagar tract (233,000 acres).—This tract includes Poona, Sholapur and Ahmednagar Districts and Akalkot State. *Banilla*, which is a derivative of a cross between *bani* (a long staple, fine, silky but low ginning cotton) and *Comilla* (a short staple but very high ginning cotton), is the improved variety grown in this tract. With a staple length of 11/16" and a high ginning percentage of 39, *Banilla* has been adjudged suitable for spinning 19's highest standard warp counts. The area covered by it in this tract during the year was 9,000 acres.

Khandesh tract (1,085,000 acres).—This tract covers the districts of East Khandesh, West Khandesh (excluding Nawapur Peta) and Nasik. *Khandesh Banilla* was the original improved strain evolved for this tract, but owing to its susceptibility to wilt, its extension has been abandoned in favour of *Jarila* which is a selection from *verum* evolved under the Jalgaon Cotton Breeding Scheme. *Jarila* is wilt-resistant and spins 24's warp under mill conditions. It has a ginning percentage of 33-35 and a staple length of 3/4" to 7/8". During the year under review it fetched an average premium of Rs. 35 'on' Broach and Rs. 60 'on' the local cotton. The estimated area under it during the year was some 200,000 acres including natural spread, *i.e.*, nearly 18% of the Khandesh tract. Out of the pure seed produced on Government Farms and in controlled areas, the quantity stocked by the Agricultural Department and approved stockists for distribution in 1941-42 season was 3,523, 650 lbs.

Surti tract (432,000 acres).—This tract comprises Surat District, Ankleshwar Taluka of Broach and Panch Mahals District, Nawapur Taluka of West Khandesh District, the Surat States and Rajpipla State, extending to the Navsari District of the Baroda State. 1027 A.L.F. is the improved cotton grown in these areas. It was evolved from a cross between *Kumpta* and *Goghari* cottons and has a staple length of 15/16″ to 1″ and a ginning percentage of 33-36 and is capable of spinning up to 24's/30's warp. The total area under it during the year was 268,000 acres, excluding Baroda State. The Committee finances a scheme for grading and marking of 1027 A.L.F. cotton in the Surat protected area and 4,837 bales were sold under 'Agmark' at premiums ranging from Rs. 5 to Rs. 26 on the local.

Broach tract (488,000 acres).—This tract includes Broach and Panch Mahals District (excluding Ankleshwar Taluka), Kaira District, States in Gujerat States Agency (excluding Rajpipla and Surat States). B.D. 8 is the improved strain grown in this tract. It was originally selected from a variety of cotton known as "*Purified Broach Deshi*" grown on the Broach Farm and has a staple length of $\frac{7}{8}$″, a ginning percentage of 33.7 and a spinning capacity of 30's warp. The total area under it during the year was 10,000 acres and it fetched a premium of Rs. 85 to Rs. 132 on Broach against Rs. 20 to Rs. 39 obtained in the previous year.

SIND.

The total area under cotton in Sind, including Khairpur State was 974,000 acres, of which Sind-American occupied 666,000 and Sind *desi* 308,000 acres. The area under improved varieties was about 87% of the total.

In the Sind-American tract four types of cotton, *viz.*, Sind-American 4F Sind *Sudhar* (*289-F-1*), Sind-American 289-F types (other than Sind *Sudhar*) and Sind-American 98, are grown. 4F (staple length $\frac{3}{4}$″, spinning capacity 20's warp) is the original type of American cotton introduced from the Punjab. Sind *Sudhar* (*289-F-1*) is a high yielding cotton grown all over the Left Bank of the Indus. It is a selection from Punjab-American 289-F and with a ginning percentge of 29 to 30 and staple length 1″, it is capable of spinning 32's warp counts. It is resistant to both red leaf blight and jassid attack and can withstand seasonal variations of climate better than the ordinary 289-F and similar cottons. There were some 273,000 acres under it during the year. Under Sind-American 289-F types (other than Sind *Sudhar*) are included

the improved varieties variously known as K.T., N.T., L.S.S., *etc.* The propagation of these strains has been discontinued by the Agricultural Department in favour of Sind *Sudhar*. Sind-American 98 was evolved from ordinary 4F cotton ; with a ginning percentage of 33, and a staple length of $\frac{7}{8}$" to 15/16", it is capable of spinning 26's warp counts. It is considered to be the most suitable type for cultivation in the new cotton area on the Right Bank of the Indus. There were some 59,000 acres under it during the year.

The improved Sind *desi* cotton known as Sind N.R. or 27 W.N. is the standard *desi* cotton of Sind and is grown in the Nawabshah District and the upper part of Hyderabad District. Sind N.R. gives 16 to 20% higher yield and 4 to 5% higher ginning outturn than the ordinary Sind *desi*. The area under it during the year was 220,000 acres which is 71% of the total *desi* acreage.

PUNJAB.

The total area under cotton in the British districts of the Province was 2,679,000 acres of which 1,437,000 acres were under Punjab-American and 1,242,000 acres under Punjab *desi*. The total estimated area of about 2,120,000 acres (*i.e.* 79% of the total cotton acreage) under improved varieties during the year was distributed as under :—

	Acres.
(*a*) *Punjab-American varieties* :—	
(*i*) 4F	931,000
(*ii*) L. S. S.	175,000
(*iii*) 289-F & K.T. 23	21,000
(*iv*) 289-F/43	124,000
(*v*) 289-F/K. 25	186,000
Total ..	1,437,000
(*b*) *Improved desi cottons* :—	
(*vi*) Mollisoni	629,000
(*vii*) Other improved types	54,000
Total ..	683,000

(*i*) 4F (ginning % 31, staple length $\frac{3}{4}$" to $\frac{7}{8}$") was the first improved variety to be distributed by the Agricultural Department. It is capable of spinning 20's highest standard warp counts and is grown chiefly in the Canal Colonies, Western Punjab and Fazilka sub-division of Ferozepur District. It is now being replaced by the recently evolved improved strains of cotton.

(*ii*) L. S. S. a selection from 4F, is chiefly grown in Lyallpur, Sheikhupura and parts of Shahpur Districts. It has a ginning % of 31 and a staple length of 15/16", and is capable of spinning up to 26's highest standard warp counts. When marketed in bulk, L.S.S. fetches a better price than 4F. It is a high yielding cotton but matures late, and, therefore, requires one or two irrigations in October.

(*iii*) 289-F/43 is a long staple, high yielding, early maturing variety which is at the same time resistant to jassid attack. It gins 29%, and has a fibre length of 1" and a spinning capacity of 35's/40's warp. It is tolerant to shortage of water and matures and gives the first picking at the same time as *desi* cottons and, therefore, does not suffer from early frost. It is most popular in Lower Bari Doab Canal Colony (except Khanewal Division), Nili Bar and inundation tracts, and in Lower Chenab Canal Colony. It withstands late sowing better than other varieties especially in south-western parts of the province, and if, for any reason, late sowings up to the end of June have to be done, this variety is recommended. It has, however, the disadvantage of being, comparatively, a low ginner, 29% against 33% in the case of 289-F/K.25.

(*iv*) 289-F/K.25 was selected by the British Cottor Growing Association (Punjab) Ltd., Khanewal, in 1932, and is at present grown in Multan and Montgomery Districts and in parts of Bahawalpur State and Sind. With a ginning outturn of 33% and a staple length of 1-1/16", it is capable of spinning 30's warp or 40's weft. Its drawback lies in its susceptibility to jassid attack.

The more important improved Punjab *desi* varieties are *Mollisoni 39* and *119 Sanguineum*.

(*v*) *Mollisoni 39* (ginning % 35-36, staple length $\frac{5}{8}$") is a tall growing variety and gives the highest yield amongst the *desi* varieties. It is very popular with the growers of *desi* cotton in the Canal Colonies.

(*vi*) *119 Sanguineum* bids fair to become the standard *desi* cotton of the south-western tract of the Punjab. It gives higher yield than the local and its ginning outturn is 36% against 34% of the local.

CENTRAL PROVINCES AND BERAR.

The total area under cotton in the Central Provinces and Berar during 1940-41 was 3,512,000 acres. Improved varieties occupied some 370,000 acres, or roughly 11% of the total. The chief improved varieties are V. 434 and *Buri 107*.

V. 434 is a pure line selection from *Verum;* its chief merit lies in its adaptability to the varying soil and climatic conditions. Besides being resistant to wilt and drought, it possesses prolific flowering capacity, quickness in forming buds and setting fruit, comparative freedom from shedding and excellent lint characters. It has a ginning outturn of 31%, a staple length of about $\frac{7}{8}$", and a spinning capacity of 20's/24's warp. It is the best all round strain available at present and is grown chiefly in Nimar, Wardha and Nagpur districts and Berar. The area under it during the year was 272,000 acres and it fetched a premium of Rs. 76 per *candy* over the local Oomras. Apart from V. 434, other *verum* strains like *No. 438* and late *Verum* were grown to the extent of a few thousand acres.

Buri 107, a selection from acclimatised *Upland* American cotton, is grown chiefly in the Burhanpur Tahsil of the Nimar District for which it has been found to be particularly suitable. It yields well but suffers from the defect of being a low ginner, its ginning outturn being 27 to 28%. The staple is good, about $\frac{7}{8}$" to 15/16", though somewhat weak; it is capable of spinning up to 30's warp. The area under it during the year was 35,000 acres. Other *Buri* strains covered 5,000 acres.

MADRAS.

The total area under cotton in the Madras Province (including Pudukkottai and Banganapalle States) was 2,391,000 acres of which 891,000 acres (or 37%) were under improved superior strains. The position of improved strains in the different tracts is dealt with below; the figures in brackets after each tract refer to the area under cotton in 1940-41.

Cambodia tract (523,000 acres).—Cambodia, an acclimatised American Upland cotton, is the original improved type introduced in this tract, which comprises the districts of Salem, Coimbatore, Trichinopoly (including Pudukkottai State), Madura, Ramnad, Tinnevelly and South Arcot. This variety is now being replaced by several better strains such as *Cambodia* Co. 2, Co. 3, and Co. 4, etc.

Co. 2, a selection from Cambodia, is a robust, jassid resistant, high yielding type possessing large bolls which open widely. With a ginning outturn

of 33 to 35% and a lint length of 15/16″ to 1″ it is capable of spinning 24's/30's warp. Compared with ordinary Cambodia, Co. 2 is estimated to benefit the grower to the extent of Rs. 15 per acre. Another strain 920 is now gradually replacing Co. 2 in parts of Coimbatore District, on account of its sturdier growth and lesser susceptibility to shedding. The area under Co. 2 (including 920) in 1940-41 was 262,000 acres. Two more strains which deserve mention are the Cambodia Uganda Crosses, Co. 3 and Co. 4, both of which are earlier and more prolific than and superior in quality to either Co. 2 or 920. Co. 4 is a derivative from Co. 2×A. 12, isolated at the Cotton Breeding Station, Coimbatore. It is earlier than Co. 2 by about three to four weeks, has a staple length of 1-1/32″ and spins 40's to 42's warp; its ginning percentage, however, is only 31 against 33 to 35 of Co. 2. Trials conducted over a few years in the Ramnad District have indicated that Co. 4 gives 50 to 80% higher yield than Co. 2. Co. 3 is a strain obtained by hybridising Co. 2 with U. 4. It is as early as Co. 4 but has a finer staple (1-1/16″) and a higher ginning outturn (36 to 39%) than the latter. It is capable of spinning up to 50 standard warp counts. In 1940-41, Co. 3 and Co. 4 were grown in Ramnad, South Arcot and Tinnevelly Districts over an area of 15,000 acres.

Tinnevellies tract (705,000 acres).—The commercial Tinnevellies grown in Madura, Ramnad, Tinnevelly and Coimbatore Districts, constitute a mixture of two cottons—*Karunganni* and *Uppam*. The former is distinctly superior to the latter in general yield, quality and spinning performance. The improved *Karunganni* strains at present being propagated are C. 7, A. 10 and K. 1, which were originally evolved by selection in *Karunganni* at the Koilpatti Agricultural Research Station. C. 7 is suitable for tracts south and east of Koilpatti, while A. 10 flourishes best in the regions north of Koilpatti. Both are alike as regards lint length and ginning percentage, but in spinning performance C. 7 is superior. K. 1 was evolved by re-selection in C. 7 in a year of drought; besides being earlier and hardier than the latter, it does better than either C. 7 or A. 10 under adverse conditions and is not affected by February rains. Further, it has been found to give a higher yield than the local cottons. Owing to its earliness, drought resistance and non-shedding qualities, it is gaining popularity and is expected to replace both C. 7 and A. 10. The improved *Karunganni* cotton has an average staple length of $\frac{7}{8}$″ to 15/16″ and is suitable for spinning up to 24's warp. The area under this cotton in 1940-41 was 206,000 acres.

Westerns tract (817,000 acres).—This tract comprises the districts of Bellary, Anantapur, Cuddapah and part of Kurnool. The improved strain grown in this tract is H. 1, which is a selection from another strain H. 25. Having a ginning outturn of 31% against 27% of the commercial Westerns, and a staple length ⅞" to 15/16", H. 1 is capable of spinning up to 24's warp. It is grown chiefly on the black soils of Bellary District and in parts of Anantapur District. There were some 331,000 acres under it in 1940-41.

Northerns tract (180,000 acres).—The Northerns variety of cotton is grown chiefly in the Kurnool District (excluding Pattikonda Taluk). N. 14, the improved strain grown in this tract, was evolved by selection from the Northerns cottons and is considered to be one of the finest indigenous cottons in India. It thrives on mixed soils in years of good rainfall. With a staple length of 7/8" to 15/16", and a ginning percentage of 24, it is capable of spinning up to 24's/26's warp. There were 22,000 acres under it in 1940-41.

UNITED PROVINCES.

The total area under cotton in the Province during 1940-41 was 408,000 acres. The improved varieties, C. 520 and Perso-American, occupied 36,000 acres or 9% of the total.

C. 520 (ginning % 38, staple 5/8") is a selection, superior in quality and yield to the bulk crop of the indigenous mixture of "U. P. Bengals." It is capable of spinning 12's to 16's. The area under it in 1940-41 was 24,000 acres.

Perso-American (ginning % 32, staple 25/32") is an acclimatised foreign cotton; it can spin 30's counts. Attempts are being made to extend the area under it in Aligarh and Budaun Districts. It was grown on 12,000 acres in 1940-41.

HYDERABAD STATE.

The total area under cotton in the State during 1940-41 was 3,458,000 acres, of which, 447,000 acres (or 13 % of the total) were occupied by the improved varieties, *Gaorani 6*, Parbhani-American and *Jayawant*.

Gaorani 6, pure seed of which is being distributed on *tacavi* system in the *Gaorani* protected area of the State, is a selection from the indigenous *Gaorani* cotton. It has a staple length of ⅞" and spins up to 30's warp. Out of 934,000 acres in the Gaorani tract, it covered an area of 287,000 acres during the year.

Pure seed of Parbhani-American, which is a selection from the local American varieties, is being distributed, on *tacavi* system, in the Aurangabad District. The area under it during the year was 28,000 acres.

Jayawant (same strain as that grown in the Kumpta tract of the Bombay Province) is being extended chiefly in the *Kumpta* cotton protected area of the Raichur District. In 1940-41 *Jayawant* occupied an area of 132,000 acres in the State.

BARODA STATE.

The total area under cotton in the State in 1940-41 was 811,000 acres; improved varieties occupied 94,000 acres or 11% of the total. The position of improved varieties in the different tracts is indicated below :—

Surti tract (224,000 acres).—Surti cotton is grown in the Navsari District of the State. The improved strain being extended in this tract is 1027 A. L. F. which covered an area of 80,000 acres in the Navsari District in 1940-41.

Broach tract (400,000 acres).—The cotton crop of Baroda District is classified under Broach. The improved strain of this tract is B. D. 8, which is extending particularly in Dabhoi, Sankheda, Karjan and Sinor Talukas of the Baroda District, where wilt predominates. The area under it during the year was 7,000 acres.

In large areas of Waghodia and Savli Talukas where damage by wilt is not noticeable, B. 9, an improved type, is in keen demand. It is distinctly superior to the local Goghari and the Agricultural Department had a controlled area of 6,500 acres under it in 1940-41.

Dholleras tract (187,000 acres).—Mehsana and Amreli Districts of the State are included in this tract. In the Mehsana District, the improved strain *Wagad 8*, originally evolved by the Bombay Agricultural Department by selection in *Wagad* cotton is proposed to be extended. 647 acres were maintained under pure *Wagad 8* for seed production. In the Amreli District, pending further breeding work, C. 520 the improved *Bengals* type grown in the United Provinces, is proposed to be extended.

RAJPIPLA STATE.

The total area under cotton in the State during 1940-41 was 144,000 acres, the whole of which was sown with 1027 A. L. F. The import and sowing of *Goghari* or any other short staple cotton are prohibited under the Rajpipla Cotton Improvement Act of 1921. Pure seed of 1027 A. L. F., for distribution to the cultivators, is obtained by the State every year from the Cotton Superintendent, Surat.

CHAPTER VI.

GENERAL.

1. IMPROVEMENT IN MARKETING.

The Committee has not stopped at the production of better cottons but from its inception has devoted special attention to better marketing (in the widest sense of the word). An investigation into the financing and marketing of cultivators' cotton conducted by the Committee established beyond doubt that, in those tracts where regulated markets exist, the cultivators obtain better prices for their cotton and accordingly a recommendation was made to Provincial Governments to take steps for the establishment of such markets. As a result, legislation for the establishment of regulated markets has been enacted in Bombay and the Central Provinces, and in Madras the establishment of such markets has been provided for under the Commercial Crops Markets Act. Hyderabad, Indore and some other Indian States have also passed similar legislation, and open markets have been established.

The passing of the Bombay Agricultural Produce Markets Act, 1939, led to the repeal of the Bombay Cotton Markets Act, 1927, but provision has been made in the new Act to recognise the regulated markets established under the Bombay Cotton Markets Act, 1927. The Rules framed under the new Act were approved by the Bombay Government in June 1941. The following seven markets continued to work as regulated cotton markets under the new Act:—(1) Dhulia, (2) Dondaicha, (3) Jalgaon, (4) Amalner, (5) Baramati, (6) Bijapur, (7) Bailhongal. No new markets have been established under the Bombay Agricultural Produce Markets Act, 1939, but proposals for the notification of a number of markets, throughout the Province, are under the consideration of the authorities concerned.

In the Madras Province, the Tiruppur, Nandyal and Adoni regulated cotton markets continued to function during the year.

In the Central Provinces, a new cotton market was established at Harsud during the year.

In the Punjab, the Punjab Agricultural Produce Markets Act provides for the better regulation of the purchase and sale of and the establishment of markets for, agricultural produce including cotton. During the year the Rules under the Act were passed.

In the Baroda State, the Baroda Agricultural Produce Markets Act has been made applicable to one more market during the year at Amreli, and it is hoped that this market will function in the coming season.

In addition to the 21 markets reported in last year's report as having already been established in the Hyderabad State, the Agricultural Produce Markets Act has been made applicable during the year to Suryapet.

In Sangli State, the Huzur Order regulating the sale and purchase of commercial crops in the State continued to be in force.

In connection with the adoption of a definite cotton policy in Gujerat, the view was expressed that the crux of the whole problem centred round the better marketing of 1027 A.L.F. cotton and it was accordingly suggested that the Agricultural Produce (Grading and Marking) Act should be utilised to enable this cotton to be marketed as a special grade of Surat cotton. The Government of India were accordingly requested to include cotton in the schedule to the Act to enable specified varieties of cotton to be protected under it, the intention being that once cotton is included in the schedule, specified varieties of cotton produced in specified areas could then be stamped with a special mark, the unauthorised use of which would be illegal under the Act. The recommendation was accepted by the Government of India, and 1027 A.L.F. grown in certain tracts in Gujerat (Bombay Province) was marketed under a special AGMARK during the year under review. This arrangement, however, did not have the desired effect as buyers were reluctant to give adequate premium for "AGMARK" bales. This might possibly have been due to the abnormal conditions prevailing in the cotton trade during the season, and therefore in order to furnish additional evidence as to the effectiveness of the system, the arrangement will be continued during the next season. The application of the Rules under the Agricultural Produce (Grading and Marking) Act to 289F/1 (Sind *Sudhar*) has also been approved by the Committee and the required notification has been published by the Government of India. The application of the rules to *V. 434* cotton was approved by the Committee during the year.

As usual, Universal Standards were prepared for the following varieties of cotton :—

1. *Bengals*,
2. Sind,
3. Punjab-American,
4. Sind-American,
5. *Oomras*,
6. *Mathias*,
7. *Broach*,
8. *Kumptas*,
9. 4F Saw-ginned Punjab,
10. 289F Roller-ginned Punjab,
11. 289F Roller-ginned Sind,
12. 289F Saw-ginned Punjab,
13. 289F Saw-ginned Sind.

Owing to the lateness of the crop, standards for *Dholleras* were not prepared during the year.

Two schemes for cotton marketing surveys, on the basis of the Punjab Survey to which reference was made in last year's report, were sanctioned by the Committee during the year, one for the Madras Province and the other for Gujerat, the adjoining Agencies and States of Kathiawar and South Rajputana.

2. LEGISLATION.

In order to check the spread of undesirable or inferior types of cotton and insect pests and diseases and other malpractices, several legislative measures have been passed by the Central and Provincial Governments on the recommendation of the Indian Central Cotton Committee. A brief account of these is given below :—

(i) **Cotton Transport Act.**—The Cotton Transport Act was passed by the Central Government in 1923, at the instance of the Indian Central Cotton Committee. It enables Provincial Governments to prohibit the import of cotton, *kapas* or seed into specified areas from outside unless required for a special purpose and covered by a licence. Under this Act, protected areas have been notified in the provinces of Bombay, Madras and the Central Provinces and Berar, as also in the States of Hyderabad, Baroda, Indore, Gwalior, Rajpipla, Sangli, Chhota Udepur, Lunawada, Bhaderwa, Kadana, Sant, Jambughoda and Baria. A brief account of the working of the Act in the Provinces and States is given below :—

Bombay.—The protected areas in the Bombay Province remained unchanged. A new zone called the Mahi-Sabarmati zone was added to the

protected areas. In the tract south of the Narbada, where the Act was put into operation in May 1939, half-pressed bales from Olpad were permitted to be transported under licence to Surat for full pressing under departmental supervision and were duly marked " Olpad." The total number of bales thus pressed and sold was 17,164. Licences were also granted for the transport of seed cotton from some villages in Ankleshwar *Taluka* for sale to gins in Olpad as an experimental measure for one year. Under a notification issued by the Bombay Government, import of cotton from protected areas in Baroda State was permitted into the corresponding protected areas of Bombay Province without licence.

In the Karnatak tracts, application of the Act was very effective in the case of imports by rail. To prevent illicit imports by road, check stations were opened on the main roads on the borders of protected areas. During the year under report, there were 20 temporary and 6 permanent check stations. Illicit import of cotton was reported to have occurred to some extent through *kachha* roads. To control such illicit imports entirely or more effectively, some more check stations are proposed to be established. Some cases of fraudulent import were detected and cotton thus imported was sent back in most cases.

Proposals for the inclusion of Nawapur Peta (Khandesh) in the Surat protected area have been submitted to the Bombay Government on the ground that *Surti* cotton, similar to that grown in South Gujerat, is grown in this *Taluk*.

Madras.—The Act is reported to have worked smoothly. There was no change in the protected areas. Up to June 1941, the Act prohibited the import of cotton (*kapas*, ginned cotton and cotton waste) into protected areas, except under licence, by rail and sea only, but during the year, the Madras Government issued a notification restricting imports, under the same conditions, by road as well. It may be mentioned in this connection that under the Rules under the Act, issued by the Madras Government, no restriction is placed on the import of cotton seed into the protected areas. In view, however, of the possibility of admixture resulting, the Government of Madras were requested to consider the desirability of prohibiting, except under licence, the import of cotton seed also into protected areas.

Central Provinces.—The protected areas in the Central Provnces and Berar remained unchanged in the year under review.

The protected areas in the Hyderabad, Gwalior, Indore, Rajpipla, Sangli, Chhota Udepur, Baria, Lunawada, Bhaderwa, Kadana, Sant and Jambughoda States also remained unchanged during the year.

Baroda State.—There was no change in the protected areas. Arrangements are now being made to institute a separate Mahi-Sabarmati zone.

Indore.—The amplification of the Cotton Transport Act with a view to restricting the import of *Bengals* cotton is under consideration.

(ii) **Cotton Ginning and Pressing Factories Act.**—The Cotton Ginning and Pressing Factories Act, 1925, applies to the whole of British India, and practically all cotton growing Indian States have passed similar legislation. Under this Act every bale of cotton is required to be stamped with a special mark showing where it was pressed ; the Act also regulates certain matters connected with the management of cotton ginning and pressing factories and makes compulsory the submission by pressing factories of weekly returns of cotton pressed. Modifications in the rules have been called for from time to time, but the working of the Act has undoubtedly been a salutary check on malpractices. The Act, as amended by the Provinces of Bombay and the Central Provinces and Berar, prohibits watering, mixing and admixture of cotton and makes it obligatory on all cotton ginning and pressing factories situated in areas to which the Act is applied to obtain licences for their working. The Government of Bombay have since issued notifications under rule 2A of the Bombay Cotton Ginning and Pressing Factories Rules, 1925, and Section 3A of the Cotton Ginning and Pressing Factories Act, 1925, as amended by Bombay Amendment Act IV of 1936. The provisions in the Act in respect of admixture of cotton are enforced in specified areas by these notifications. The Cotton Ginning and Pressing Factories Rules,† 1941, framed by the Government of Sind, under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, were brought into force with effect from the 18th April, 1941.

The Cotton Ginning and Pressing Factories (Madras Amendment) Bill was considered by the Committee, which recommended the deletion of clause 4 " 3(A) 3 " of the Bill and the addition of a new section on the lines of Section 3.AA of the Cotton Ginning and Pressing Factories (Bombay Amendment)

† Appendix VIII (page 158.)

133533

Act, 1938. It was further recommended that in adopting Section 3.AA, the fine of Rs. 5,000 should be reduced to Rs. 1,500. The proposal of the Madras Government to amend Section 6 of the Cotton Ginning and Pressing Factories Act, in order to make it obligatory on the part of the owner of a factory to maintain the prescribed scales and weights on the premises and produce them for inspection when called upon to do so, was also approved.

With a view to checking malpractices in ginning and pressing factories and the presence of foreign matter in Indian cotton bales, the various Provinces, which had not amended the Cotton Ginning and Pressing Factories Act, 1925, and the major cotton growing States were again requested to introduce the necessary legislation on the lines of the Bombay and the Central Provinces and Berar Cotton Ginning and Pressing Factories (Amendment) Acts, to provide for the licensing of ginning and pressing factories and the penalization of the presence in cotton bales of cotton seed (in excess of a prescribed percentage), cotton waste and foreign matter. The Baroda State have already passed legislation similar to that in the Bombay Province. In Sind, the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, and the Rules framed thereunder by the Government of Sind, were brought into force during the year. The desirability of including a specific provision in the Act as applied to Sind, against the mixing of cotton waste with cotton was considered, but as the malpractice was reported not to exist at present in the Province, it was decided not to take action until specific complaints were received. In the Punjab and Madras Provinces and in the Mysore, Holkar and Patiala States, the question of introducing legislation is under consideration. In connection with the control of malpractices, such as mixing, watering, etc., in the Punjab, the desirability of providing adequate safeguards against penalizing natural field mixtures of *desi* and American cottons was stressed and it was decided that a recommendation should be made to the Provincial Government to allow a sufficient time lag between the passing of the legislation and its actual application to enable the growers to adjust their practices to the requirements of the Act. In so far as the Provinces of North-West Frontier, Bengal, Assam, Orissa and Ajmer-Merwara are concerned, it was felt that the quantity of cotton production is so small that the need for legislation was not pressing.

A report was received to the effect that, in a certain ginning factory in the Central Provinces and Berar, *bojas* of pressed cotton were rolled on wet

ground for some days, while in another ginning factory in the same province, a bucket of water was poured through a funnel into a *boja* of ginned cotton which was then rolled briskly on the ground. As such practices are not effectively dealt with under the existing provisions of the Cotton Ginning and Pressing Factories Act, as applied to the Central Provinces and Berar, suitable amendment of the Act was suggested.

Under Section 9(1)(*b*) of the Cotton Ginning and Pressing Factories Act, 1925, approval by the prescribed authority of the plans and specifications for the erection of new ginning factories is necessary, except in the case of factories with not more than four roller gins. It was reported to the Committee that this exemption was being taken advantage of by some gin owners in the Central Provinces and Berar and that, as a result, several four-roller gin factories had been erected in recent years. As, apart from the *kachcha* structure of the building in which ginning in these factories was carried out, there was the possibility of cotton ginned in such factories being mixed with seed in excess of the prescribed percentage, owing to the absence of a separate entrance for *kapas*, the Director of Industries suggested that the proviso in question should be deleted. This suggestion was accepted by the Committee and it was further recommended that, for the sake of conformity, the proviso to Section 9(1A) should also be deleted. The Government of India have accordingly been addressed in the matter.

In the Karnatak, a few cases of admixture of cotton were detected and brought to the notice of the authorities, who warned the persons concerned. In Khandesh, the malpractice of watering is reported to have been completely checked, while mixing cotton waste with good cotton has been appreciably stopped. In Gujerat, the malpractices of watering and mixing of foreign substances are reported to have died out.

In the Central Provinces and Berar, no breaches of the Act were reported during the year.

Under the Central Provinces Cotton Ginning and Pressing Factories (Amendment) Act, 1939, which authorises the fixing of rates chargeable for ginning and pressing cotton and the appointment of rate-fixing committees in specified areas, ten areas were duly notified. The rates fixed were generally considered to have been reasonable, though complaints were received from factory-owners in Khandwa and Ellichpur.

In Madras Province, about 200 cotton ginning and pressing factories were inspected during the year by officers of the Factories Department and Agricultural Department and about 100 factory-owners were prosecuted for offences under Sections 3 and 6 of the Cotton Ginning and Pressing Factories Act regarding the maintenance of registers and scales and weights, respectively.

In the Punjab, two prosecutions were instituted against factory-owners for failure to comply with the provisions of Sections 3 and 9 of the Cotton Ginning and Pressing Factories Act in regard to maintenance of registers and structural requirements. The cases are still pending.

In the United Provinces, cotton ginning and pressing factories were inspected by the District Magistrates concerned. In the case of one factory which was found not to be in possession of necessary equipment for the proper marking of bales, the District Magistrate was requested to take necessary action under the provisions of the Cotton Ginning and Pressing Factories Act.

During the year under report, complaints were received from four mills regarding the presence of foreign matter in cotton bales pressed in the Provinces of Bombay, Sind and the Central Provinces and Berar and the Baroda State. These were reported to the appropriate authorities for necessary action. A complaint regarding the prevalence of the malpractice of watering cotton at Bhilwara (Mewar State) was reported to the authorities concerned and as a result, a general warning was issued against repetition of the malpractice.

Out of 70 Indian States which have enforced in their territories the main provisions of the Cotton Ginning and Pressing Factories Act as applied to British India, by legislation or executive orders, weekly returns of cotton pressed were received from 63 ; in the remaining 7 States, pressing factories did not work during the year.

(iii) **Prevention of introduction of Foreign Cotton Pests.**—In order to prevent the introduction into India of the Mexican Boll-weevil (*Anthonomus grandis*) with imported American cotton, at the instance of the Committee, regulations have been imposed by the Government of India under which the import of American cotton into India is prohibited except through the port of Bombay where it must be fumigated with hydrocyanic acid gas

before entry into the country. The work of fumigation is carried out under the technical supervision of the Secretary, and the cost involved is met by the levy of a small fee from importers on each bale of American cotton fumigated. Owing to the restrictions necessitated by the war, the imports of American cotton during the year under review amounted to only 1930 bales against 83,140 bales in the preceding year.

The Red (Sudan) Bollworm (Diparopsis castanea) and other pests.—The restriction on the import of foreign *kapas* (unginned cotton) and of foreign cotton seed remained in force throughout the year. 126 parcels of foreign cotton seed were received during the year, examined and fumigated, where necessary.

(iv) Madras Cotton Control Act.—This Act, which came into force in 1932, prohibits the cultivation and mixing of the short staple *neglectum* cotton, locally known as *Pulichai*, in the long staple cotton growing tracts producing *Tinnevellies*, *Karungannies* and Cambodias. It is reported that no breach of the Act was committed in the Coimbatore district. The Koilpatti and Sankarankoil *Taluka* of the Tinnevelly district accounted for the largest number of cases of infringement of the Act. The number of prosecutions launched against the cultivators totalled 728, of which, 560 cases are still pending; 168 persons were convicted and the fines levied amounted to Rs. 747-8-0. In the Madura district, 40 prosecutions were launched and the fines levied totalled Rs. 59, while in the Ramnad district, there were eight prosecutions, the fines levied totalling Rs. 22.

(v) Bombay Cotton Control Act.—To check the spread of *Goghari*, a short staple high ginning *herbaceum* cotton, which threatened to invade the long staple cotton areas in Gujerat, the Bombay Government passed the Bombay Cotton Control Act in 1935, under which the cultivation, mixing or possession of *Goghari* in specified areas is a penal offence. As a result of the introduction of the Act and vigorous propaganda by the Agricultural Department, *Goghari* has completely disappeared from the areas where it was at one time extensively grown. During the year under review, the Act is reported to have worked satisfactorily in the area south of the Narbada. A few farmers in Ankleshwar area grew *Goghari* and permission has been obtained to prosecute them. It is expected that this will completely stop the growing of *Goghari* in this area. There is said to be a potential danger of the spread of Selection 1A, in preference to 1027 A. L. F. in parts of the Surat district where *Goghari*

was formerly grown, and, if the extension of this cotton is to be controlled, the Act would require to be so amended as to empower the Provincial Government to prohibit the cultivation and handling of any specified type or types of cotton, the spread of which the Provincial Government may desire to restrict. For this purpose the Provincial Government have drafted a bill to replace the existing Bombay Cotton Control Act. On the other hand, the poor premium received for 1027 A. L. F. during the season has again brought to the fore the controversy regarding the relative merits of 1027 A. L. F. and Selection 1A and the whole question will again be reviewed by the Committee at its cold weather meeting.

(vi) **Central Provinces Cotton Control Act.**—This Act, which was passed into law towards the end of 1936, has for its object the elimination, from the Central Provinces and Berar, of Garrow Hill cotton, a very inferior, coarse, but prolific variety, which threatens to mar the reputation of the Central Provinces cotton and thus to nullify the efforts of the Agricultural Department in the matter of cotton improvement. The Act has been applied for a period of five years to the districts of Nagpur, Wardha, Amraoti, Yeotmal, Buldhana, Akola and Nimar and Sausar *tehsil* of Chhindwara district. From the beginning of 1939, systematic propaganda has been carried out by the Department against this inferior cotton but during the year it was noticed that the cultivation of Garrow Hill was still carried on in certain areas and propaganda has accordingly been intensified.

(vii) **Baroda Cotton Control Act.**—The Bombay Cotton Control Act of 1935 was, by a notification of the Baroda State, dated the 25th April, 1936, applied to the State with certain modifications to meet its own requirements. The Act has now been replaced by the Baroda Cotton Control Act, 1941, which empowers the Durbar to notify areas for control, to fix the standard variety or varieties to be grown in controlled areas, to prohibit in the controlled area the cultivation of any variety other than the standard variety and the mixing of varieties, possession or use of, or trade in, the prohibited variety or varieties. Rules have been framed under the Act and it has been made applicable to the Navsari district where 1027 A.L.F. has been fixed as the standard variety and the cultivation of any other variety is prohibited.

(viii) **Bhopal Cotton Control Act.**—The Bhopal Cotton Control Act, which was enacted in April 1937, aims at promoting the cultivation of superior

cottons and prohibiting the growing of inferior cottons in the Bhopal State. The State Department of Agriculture is working out a scheme to ensure an adequate supply of pure seed. However, since the preliminary work has not yet been completed, the Act has not come into operation.

(ix) **United Provinces Cotton Pest Control Act.**—This Act has been passed into law and rules have been framed under it. However, the final publication of the rules has been postponed for the time being.

3. RESEARCH STUDENTS.

In the beginning, the Committee undertook to train a body of research workers in the various branches of science pertaining to cotton for employment on its research schemes. Gradually, however, the necessity for this has disappeared and scholarships are now, generally speaking, only awarded when need arises for research workers with specialised training in a particular branch of science to meet the requirements of one or other of the Committee's schemes or for employment in Provincial Agricultural Departments. Fifty-four scholarships and nine training grants have been awarded so far; out of these, one scholarship and six training grants were for studies abroad. Expenditure on research studentships up to the 31st August, 1941, amounted to Rs. 2,80,156.

In view of the paucity of openings for employment of research scholars after completion of their training, and with a view to utilising the facilities available under the Cotton Genetics Research Scheme, Indore, for training in the modern methods of plant breeding and genetics (with special reference to cotton), the application of statistical methods to genetics and plant breeding and the technique of field experiments for varietal and other trials, arrangements have been made to give training on the scheme every year to one or two persons already in service in the Provincial or State Departments of Agriculture or in the Committee's schemes. The normal period for this training is ten months from May to March.

4. COLLECTION AND SUPPLY OF INFORMATION.

As usual, notes on the progress in the introduction of improved varieties of cotton in the Provinces and Indian States and on the work of the Committee were supplied to the East India Cotton Association and the Karachi Cotton Association for publication. The weekly statements of purchases and arrivals of American cotton were published for general information. The

names of pressing factories in Indian States with the requisite details regarding press marks, name of owner or occupier, etc., were communicated to the Director-General of Commercial Intelligence and Statistics, Calcutta, for publication in the Indian Trade Journal and for incorporation in the all-India list of cotton pressing factories published by that Department.

Press notes and leaflets describing the various activities of the Committee and other matters of interest to the cotton industry in general were issued from time to time, during the year.

5. PUBLICATIONS.

Several important scientific and technical journals are received by the Committee, partly by subscription and partly on an exchange basis. These are circulated among its research workers who are thereby enabled to keep in touch with the latest scientific literature which otherwise would not ordinarily be accessible to them.

The Committee desires to express its indebtedness to those institutions which have placed its name on their free mailing lists, in particular to the British Cotton Industry Research Association for its Summary of Current Literature and the Shirley Institute Memoirs, and to the Empire Cotton Growing Corporation, the British Cotton Growing Association, the East India Cotton Association and the Karachi Cotton Association, for the supply of their publications. The Committee also records its thanks to the Indian Trade Commissioner, London, the U.S.A. Department of Agriculture, the U.S.A. Agricultural Experiment Stations, the Lingnan University, Canton, China, the Mitsubishi Economic Research Bureau, Tokio, Japan, the Egyptian Ministry of Agriculture, Technical and Scientific Service, the Liverpool Cotton Association, the Imperial Agricultural Bureau, London, the Imperial Bureau of Plant Genetics, Cambridge, the Manchester Cotton Association, the Textile Institute, Manchester, the Imperial Institute, London, the Indian Statistical Institute, the National Institute of Sciences, Calcutta, the Indian Central Jute Committee and other Associations and Chambers of Commerce for supplying the Committee with their reports, statistics and other valuable literature from time to time.

D. N. MAHTA,
Secretary.

APPENDIX I.

MEMBERS OF THE COMMITTEE.

(1) PRESIDENT—

Mr. P. M. Kharegat, C.I.E., I.C.S., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*.

(*a*) Dr. W. Burns, C.I.E., Agricultural Commissioner with the Government of India, *ex-officio*.

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS—

Madras	Mr. P. H. Rama Reddi, I.A.S., Director of Agriculture.
Bombay	The Director of Agriculture.
United Provinces	Mr. Vishnu Sahay, I.C.S., Director of Agriculture.
Punjab	Mr. H. R. Stewart, Director of Agriculture.
Central Provinces and Berar	Mr. J. C. McDougall, I.A.S., Director of Agriculture.
Sind	Rao Saheb K. I. Thadani, Director of Agriculture.

(3) THE DIRECTOR GENERAL OF COMMERCIAL INTELLIGENCE AND STATISTICS, *ex-officio*.

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS—

The East India Cotton Association	Sir Purshotamdas Thakurdas, C.I.E., M.B.E.
The Bombay Millowners' Association	Sir Sorab Saklatvala, M.L.A.
The Bombay Chamber of Commerce	Mr. L. F. H. Goodwin.
The Indian Merchants' Chamber	Mr. Chunilal B. Mehta.
The Karachi Chamber of Commerce	Mr. A. P. Darlow.
The Ahmedabad Millowners' Association	Mr. Chandulal P. Parikh.
The Tuticorin Chamber of Commerce	Mr. J. Vonesch.
The Upper India Chamber of Commerce	Captain S. R. Pocock, M.C., M.L.A.
The Empire Cotton Growing Corporation	Sir William Roberts, C.I.E.

(5) COMMERCIAL REPRESENTATIVES NOMINATED BY CENTRAL GOVERNMENT—

Central Province and Berar	Rao Saheb P.V. Deshmukh, Mr. Y. G. Deshpande.
Madras	Mr. J. M. Doak.
Punjab	Kanwar Raj Nath.

(6) *Bengal representative* .. .. .. Mr. Suryya Kumar Basu.

(7) CO-OPERATIVE BANKING REPRESENTATIVE—

Sir Chunilal V. Mehta, K.C.S.I., (*Vice-President*).

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

Madras	Rao Bahadur R. V. Ramasundaram Pillai, Mr. L. Madhava Reddi.

Bombay	Mr. Yashwantram Rajaram Joshi, Sardar Rao Bahadur Bhimbhai R. Naik.
United Provinces	Khan Bahadur M. Ahmad Hussain Khan, Rai Bahadur Kunwar Laxmi Raj Singh, M.L.C.
Punjab	Sardar Bahadur Gurbachan Singh, M.L.A., Rai Saheb Ch. Surajmal, M.L.A.
Central Provinces and Berar	Rao Bahadur Sir Madhaorao Deshpande, K.B.E., Mr. Suganchand Tapadia.
Sind	Mr. Roger Thomas.

(9) AND (10). REPRESENTATIVES OF INDIAN STATES—

Hyderabad State	Mr. Nizam-ud Din Hyder, Director of Agriculture.
Baroda State	Mr. R. G. Allan, C.I.E., Commissioner of Agriculture.
Gwalior State	Lt. Sardar D. K. Jadhav, Director of Agriculture.
Rajputana and Central India States ..	Vacant.

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN COUNCIL :—

1. Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Southern Division, Dharwar.
2. Mr. T. G. Rama Iyer, Director of Agriculture in Mysore, Bangalore.
3. Rao Bahadur V. Ramanath Ayyar Avl., Cotton Specialist, Coimbatore.
4. Musahib-i-Khas Bahadur M. A., Rashidkhan, Home Minister, Holkar State, Representative of the Holkar State.
5. Dr. Chellaram Shewaram, Representative of the Karachi Indian Merchants' Association.
6. Dr. B. L. Sethi, Economic Botanist (Cotton & Rabi Cereals) to the Government of the United Provinces, Cawnpore.
7. The Hon'ble Mr. V. Ramadas Pantulu, President, Madras Provincial Co-operative Bank, Madras.
8. Sir Shri Ram, Representative of the Cotton Millowners of Delhi.
9. Mr. Jivandas Ladhabhai, Representative of the Karachi Cotton Association, Ltd.
10. Dewan Bahadur Sir T. Vijayaraghavacharya, K.B.E.
11. Dr. P. J. Gregory, Second Economic Botanist, Bengal.
12. Dr. T. E. Gregory, Economic Adviser to the Government of India.
13. Mr. Jamalulla, Deputy Director of Agriculture, Parbhani.

APPENDIX II.

BALANCE SHEET AS AT 31ST MARCH, 1941.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Cotton Cess Receipts	1,39,68,508 14 5		I. A. Administration		20,72,438 10 8
Less : Refunds of cess to Burma	42,369 10 9	1,39,26,139 3 8			
			B. *Improvement of Cotton Marketing.*		
Interest account :—					
Amount received on investments	21,05,832 10 2		1. Cost of exhibits, travelling allowance of representatives on the Board of East India Cotton Association and members of Standards Sub-Committee and cost of Standards	1,59,515 15 6	
Add—Refund of income-tax from interest ..	21,078 12 0				
	21,26,911 6 2				
Less :—			2. Enquiry into cost of cotton production in India	2,71,963 8 9	
1. Interest paid in advance at the time of purchasing Govt. papers (since recovered) interest on temporary overdrafts and bank's commission for collection of interest	61,832 7 5				4,31,479 8 3
2. Interest credited to Provident Fund Account	4,886 6 2		C. *Seed Distribution and Extension Schemes :—*		
3. Bank's withdrawal charges	5,342 0 0		(i) *Bombay :—*		
4. Income-tax on interest on Govt. papers ..	26,987 8 2		(1) Hubli	44,048 8 3	
5. Brokerage for securities sold	828 10 0		(2) Gadag	41,700 15 1	
6. Provision for Sinking Fund	14,661 14 0		(3) Gadag (Supplementary)	20,167 11 4	
	1,14,538 13 9	20,12,372 8 5	(4) Surat	80,842 15 10	
			(5) Athani	18,086 1 7	
Profit on conversion and sale of securities ..		3,48,982 12 2	(6) Khandesh (Banilla) ..	1,63,525 14 6	
Sinking Fund Account		14,661 14 0	(7) Khandesh (Jarila) ..	61,082 11 9	
Miscellaneous Receipts		91,009 14 1	(8) Deccan Canals (Banilla)	2,964 14 7	
			(9) B.D. 8	24,504 0 0	
Refund from Provident Fund for contributions disallowed		3,391 1/11	(10) Revised Jayawant ..	1,38,249 12 4	
			(11) Gadag No. 1	43,192 0 9	
Suspense Receipts		492 5 0	(12) Maintenance of nucleus of pure seed of improved varieties of cotton	7,653 2 0	
			(13) Scheme for control of Selection 1A	1,632 0 0	
Carried over ..		1,63,97,049 11 3	Total Carried over ..	6,47,651 5 0	25,02,918 2 11

BALANCE SHEET AS AT 31ST MARCH, 1941—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,63,97,049 11 3	Brought forward ..	6,47,651 5 0	25,03,918 2 11
			(*ii*) *Madras* :—		
			(1) Pay and allowance of Business Manager, Tiruppur	24,079 13 0	
			(2) Co. 2	41,286 2 9	
			(3) H. 1.	3,952 2 9	
			(4) Maintenance of nucleus of pure seed of improved varieties of cotton	1,746 6 5	
			Total ..	71,064 8 11	
			(*iii*) *Sind* :—		
			(1) Seed Distribution ..	3,99,598 14 4	
			(2) Maintenance of nucleus of pure seed of improved varieties of cotton	7,499 11 8	
			Total ..	4,07,098 10 0	
			(*iv*) *Hyderabad*	53,471 6 3	
			(*v*) *Central Provinces* :—		
			Maintenance of nucleus of pure seed of improved varieties of cotton	2,384 7 9	
			(*vi*) *Baroda* :—		
			(1) Navsari storage ..	20,115 15 7	
			(2) B. D. 8	5,662 15 5	
			Total ..	25,778 15 0	
			(*vii*) Lyallpur (Ginnery)	16,038 3 8	
			(*viii*) *United Provinces C.* 402 ..	18,616 11 6	
					12,42,104 3 8
			D. *Printing and Propaganda* :—		
			(1) Publicity & Propaganda ..	1,56,555 15 0	
			(2) Printing & Distribution ..	96,233 6 9	
					2,52,789 5 9
Carried over ..		1,63,97,049 11 3	Carried over ..		39,98,811 12 4

BALANCE SHEET AS AT 31st MARCH, 1941—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,63,97,049 11 3	Brought forward ..		39,98,811 12 4
			E. *Statistical Research* :—		
			(1) Studies of village consumption of Indian cotton	23,913 5 8	
			(2) Improvement of Cotton Forecast	30,772 9 0	
					54,685 14 8
			F. *Travelling Allowance* :—		
			Non-official Members		2,39,878 13 9
			II. *Technological Research* :—		
			1.A. *Technological Laboratory* (Capital Expenditure) :—		
			(1) Land & Buildings	4,07,988 14 6	
			(2) Machinery	1,23,212 1 2	
			(3) Freight	7,502 2 8	
			(4) Apparatus & Equipment ..	41,558 3 7	
			(5) Machinery & Workshop ..	5,789 8 3	
			B. *Working Expenses*	25,10,412 15 11	
			(2) Provincial	1,77,192 1 9	
			(3) Development of alternative uses for Indian Cottons :—		
			(*a*) Capital Expenditure ..	4,665 2 6	
			(*b*) Working Expenditure ..	31,087 4 11	
			(4) Investigations for improvement in the ginning of Indian cotton ..		
			(*i*) Capital Expenditure ..	28,618 6 9	
			(*ii*) Working Expenditure ..	996 1 9	
					33,39,022 15 9
			III. *Research Studentships*	2,82,446 2 4	
			Less : Refund from Mr. Taskhir Ahmad	2,090 8 0	
					2,80,355 10 4
			AGRICULTURAL RESEARCH GRANTS.		
			IV. *Bombay* :—		
			1.A. Surat Physiological	2,45,139 11 3	
			B. ,, ,, Writing-up	5,814 7 8	
			2.A. Surat Bollworm	1,14,509 9 7	
			B. ,, ,, Propaganda ..	91,468 9 2	
			C. ,, ,, Writing-up ..	2,315 3 0	
			3.A. Dharwar Wilt	1,82,836 4 11	
			B. ,, ,, Writing-up ..	10,902 10 3	
Carried over ..		1,63,97,049 11 3	Carried over ..	6,52,986 7 10	7912,755 2 10

BALANCE SHEET AS AT 31ST MARCH, 1941—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,63,97,049 11 3	Brought forward ..	6,52,986 7 10	79,12,755 2 10
			4. Khandesh	26,573 5 0	
			5. Co-ordination of Cotton Research	1,749 7 6	
			6. Jalgaon Cotton Breeding ..	62,672 2 9	
			7. Broach Cotton Breeding ..	84,172 11 5	
			8. Small Leaf Disease Survey ..	3,938 9 6	
			9. Survey of Goghari Cotton ..	4,199 5 0	
			10. Defibration of Cotton Seeds ..	4,878 5 9	
			11. Plant Puller Propaganda ..	21,578 2 9	
			12. Breeding of Wilt Resistant Cotton for Surat Area	9,520 8 3	
			13. Inclusion of Northerns & Westerns at Bijapur	7,135 14 7	
			14. Poona Wilt Breeding ..	32,145 13 0	
			15. Interspecific Hybridization at Surat	16,000 15 0	
			16. Dholleras Wagad Cotton at Viramgam	19,006 7 8	
			Total ..	9,46,558 4 0	
			V. *Madras* :—		
			1. Herbaceum	1,42,466 13 1	
			2. Pempheres and Physiological ..	1,85,153 5 4	
			3. Fodder Cholam	19,517 9 4	
			4. Breeding of Nadam cotton ..	17,217 14 7	
			5. Improvement of Mungari cotton	15,928 0 6	
			6. Investigation of the possibilities for control of cotton stem weevil	6,230 6 0	
			7. Improvement of Cocanadas ..	5,964 5 0	
			Total ..	3,92,478 5 10	
			VI. *Punjab* :—		
			(*a*) Botanical	5,89,099 10 9	
			(*b*) Entomological	2,25,908 7 11	
			(*c*) White Fly	48,721 4 1	
			(*d*) Root Rot	66,457 9 10	
			(*e*) Spraying Trials	10,191 13 6	
			(*f*) Defibrating and Delinting ..	6,112 8 9	
Carried over ..		1,63,97,049 11 3	Carried over ..	9,46,491 6 10	79,12,755 2 10

BALANCE SHEET AS AT 31ST MARCH, 1941—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,63,97,049 11 3	Brought forward ..	9,46,941 6 10	79,12,755 2 10
			(*g*) Survey of Disease of Malformation	1,730 10 6	
			(*h*) Physiological	2,69,123 9 1	
			(*i*) Clean-up Campaign of Spotted Bollworm	59,756 5 3	
			(*j*) Jassid Investigation	11,101 7 6	
			(*k*) Improvement of Punjab-American	7,197 5 0	
			Total ..	12,95,400 12 2	
			VII. *Central Provinces* :—		
			(*a*) Botanical	4,93,449 9 4	
			(*b*) Entomological	12,344 13 6	
			(*c*) Investigation of Heliothis Obsoleta	1,698 14 0	
			(*d*) Central Provinces and Berar Cotton Breeding	18,357 5 9	
			Total ..	5,25,850 10 7	
			VIII. *United Provinces* :—		
			(*a*) Pink Bollworm	1,46,646 13 10	
			(*b*) Rohilkhand & Bundelkhand Survey	18,061 14 4	
			(*c*) Botanical	40,137 7 9	
			Total ..	2,04,846 3 11	
			IX. *Indore* :—		
			(*a*) Institute of Plant Industry ..	18,96,943 12 0	
			(*b*) Cotton Genetics Research Scheme	34,614 2 3	
			Total ..	19,31,557 14 3	
			X. *Sind* :—		
			(*a*) Physiological	2,63,945 12 10	
			(*b*) Jassid Investigation	7,454 13 1	
Carried over ..		1,63,97,049 11 3	Carried over	2,71,400 9 11	79,12,755 2 10

RECEIPTS.	Rs.	a. p.	Rs.	a. p.	EXPENDITURE.	Rs.	a. p.	Rs.	a. p.
Brought forward ..			1,63,97,049	11 3	Brought forward ..	2,71,400	9 11	79,12,755	2 10
					(*c*) Black-headed Cricket	9,245	1 3		
					(*d*) Scheme for investigation for production of long staple cottons	27,728	13 3		
					(*e*) Bollworm Investigation and Clean-up Scheme	6,837	7 0		
					Total ..	3,15,211	15 5		
					XI. *Burma* :—				
					(*a*) Capital Expenditure	2,906	15 5		
					(*b*) Cotton Improvement	47,790	3 9		
					Total ..	50,697	3 2		
					XII. *Hyderabad* :—				
					(*a*) Botanical	3,64,375	2 3		
					(*b*) Cotton Survey	36,578	3 0		
					(*c*) Pink and Spotted Bollworm ..	83,986	10 10		
					(*d*) Improvement of Kumpta cotton	19,043	7 7		
					(*e*) Inclusion of Northerns and Westerns in Dry Farming Scheme at Raichur	1,543	0 0		
					(*f*) Pink and Spotted Bollworm Clean-up Campaign	53,929	2 0		
					Total ..	5,59,455	9 8		
					XIII. *Bikaner*	62,012	13 2		
					XIV. *Baroda* :—				
					(*a*) Root Rot	82,145	9 2		
					(*b*) Comparative Tests	4,251	5 3		
					(*c*) Survey of Goghari Cotton ..	3,891	14 7		
					(*d*) Plant Puller Propaganda ..	30,048	9 3		
					(*e*) Mathio Cotton at Amreli & Jagudan	13,752	0 5		
					Total ..	1,34,089	6 8		
Carried over ..			1,63,97,049	11 3	Carried over ..			79,12,755	2 10

BALANCE SHEET AS AT 31st MARCH, 1941—(*concld*).

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,63,97,049 11 3	Brought forward ..		79,12,755 2 10
			XV. *Bengal Comilla*	30,513 9 9	
			XVI. *Mysore Doddahathi*	13,983 3 6	
			XVII. *Collection of Iran Cottons*	3,121 12 0	
			XVIII. *Baluchistan*:—Co-ordination of research on Black-headed Cricket in Sind and Baluchistan	1,894 10 0	
			XIX. *Preliminary Scheme at Nawanagar* ..	323 12 4	
			XX. *Estimation of effects on cotton crop of the use of Plant Puller*	4,148 12 5	64,71,639 14 10
			Total ..		
			MARKETING SCHEMES.		
			XXI. (*a*) Punjab Cotton Marketing Survey	7,214 1 6	
			(*b*) Baroda Better Marketing of 1027 A.L.F.	7,408 14 10	
			(*c*) Extension and Marketing of V. 434 C.P.	2,91,534 4 7	
			(*d*) Distribution and Marketing of Buri 107 C.P.	12,161 9 0	3,18,318 13 11
			XXII. *Miscellaneous Schemes*—Compilation of Manurial Trials		178 0 0
			XXIII. *Loan Recoverable but considered doubtful*:—		
			Hubli Co-operative Cotton Sale Society	6,353 2 0	
			Less—Amount refunded in full ..	6,353 2 0	..
			By Suspense account		2,783 12 3
			By Balance		16,91,373 15 5
GRAND TOTAL ..		1,63,97,049 11 3	GRAND TOTAL ..		1,63,97,049 11 3

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH, 1941.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Subscribers' contribution account	3,86,272 9 0		Advance to Subscribers	70,741 13 0	
Less—Payment made to subscribers resigned ..	1,19,504 5 7	2,66,768 3 5	*Less*—Recoveries made upto 31-3-1941 ..	59,947 13 0	10,794 0 0
Committee's contribution account	3,77,162 10 11		Accrued interest on Govt. Paper up to 31-3-41 credited to subscribers for distribution ..		3,443 3 0
Less—Payment made to subscribers resigned and forfeitures for Committee's contributions disallowed	1,15,430 10 6	2,61,732 0 5	By Balance		5,86,672 10 3
Suspense deposit of Mr. Dutt's own contribution		1,244 4 2			
Investment Fluctuation account		11,766 7 5			
Lapse and Forfeiture account		2,999 0 11			
Suspense Receipts for amount due to subscribers deceased :—					
(1) Mr. S. R. Bagde	4,415 2 0				
(2) Mr. N. Sreenivas	1,984 10 11	6,399 12 11			
TOTAL ..		5,50,909 13 3	TOTAL ..		5,50,909 13 3

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st MARCH, 1941.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1940 ..	18,97,312 4 4			Administration of the Committee. (Including Improvement of Cotton Marketing, Seed Distribution and Extension Schemes, Printing and Propaganda, Statistical Research, and Travelling Allowance of Non-Official Members and Compilation of results of manurial trials)..		2,81,203 9 5
Loans Recoverable	6,353 2 0					
Sinking Fund	12,821 11 0	19,16,487 1 4		Agricultural Research Grants-in-Aid (Including Marketing Schemes)		3,77,378 12 8
Less—Refunds of Suspense Receipts received during 1939-40		362 7 9	19,16,124 9 7	Technological Research		2,29,936 12 7
Receipts under Section 12 of the Indian Cotton Cess Act, 1923			6,10,556 0 5	*Closing Balance* :—		
Other Receipts :—				(Government Paper at cost). 3% Government of India Defence Bonds, 1946, of the Face Value of Rs. 6,75,500	6,73,500 0 0	
Sale of Publications, Sale of Cotton, Miscellaneous Receipts, Test Fees etc.	18,810 8 9			*3½% Government of India Loan, 1947-50, of the Face Value of Rs. 4,50,000	3,93,314 1 0	
Suspense Receipts	492 5 0			4½% Government of India Loan, 1955-60, of the Face Value of Rs. 26,000	25,004 0 0	
Sinking Fund Provision for 1940-41 ..	1,840 3 0	21,143 0 9		6% Bombay Municipal Debentures, 1954, of the Face Value of Rs. 10,000	3,950 0 0	
Interest on Investments		68,778 3 7		6% Rangoon Municipal Debentures, 1955, of the Face Value of Rs. 3,83,500	4,15,328 2 0	
		89,921 4 4		4% Karachi Port Trust Coupon Debentures, 1943, of the Face Value of Rs. 80,000	81,800 0 0	
Less—Loss on Redemption of 5% Government of India Loan, 1940-48 ..		33,925 0 0	55,996 4 4		15,92,896 3 0	
				(Market Value on 31st March, 1941, Rs. 17,36,611 5 0).		
				*3½% Government of India Loan, 1947-50, of the Face Value of Rs. 1,50,000 has been deposited with the Imperial Bank of India, Bombay, as Security against any overdraft that may be required by the Committee		
				Fixed Deposit with the Central Bank of India, Ltd. ..	66,000 0 0	
				Current Account with the Imperial Bank of India, Bombay	28,008 6 5	
Carried over ..			25,82,676 14 4	Carried over ..	16,86,904 9 5	8,88,519 2 8

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1941—*(concld.)*

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Brought forward ..			25,82,676 14 4	Brought forward		16,86,904 9 5	8,88,519 2 8
				Imprests :—			
				Committee's Account as certified by the Secretary	1,649 6 0		
				Technological Research Laboratory as certified by the Director, Technological Research Laboratory	500 0 0		
				Director of Agriculture, Sind, as certified by the Director of Agriculture, Sind	700 0 0		
				Cotton Research Botanist, Lyallpur, as certified by the Cotton Research Botanist, Lyallpur	150 0 0		
				Plant Physiologist, Punjab, as certified by the Plant Physiologist, Punjab	100 0 0		
				Director of Agriculture, Bombay Province as certified by the Director of Agriculture, Bombay Province	1,370 0 0		
						4,469 6 0	
				Suspense (Recoverable)		2,783 12 8	
				† Total Closing Balance			16,94,157 11 8
Total ..			25,82,676 14 4	Total ..			25,82,676 14 4
				† Includes Rs. 14,661-14-0 on account of Sinking Fund.			

We have examined the above Statement of Receipts and Payments of the Indian Central Cotton Committee with the Books, Vouchers and certified Returns of the Committee, have obtained all the information and explanations we have required and certify that to the best of our information and explanations received, the above Statement is a correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the Indian Cotton Cess Act, 1923.

(Sd.) S. B. BILLIMORIA & Co.,
Registered Accountants, Auditors.

BOMBAY, *4th June*, 1941.

PROVIDENT FUND ACCOUNT AS AT 31st MARCH, 1941.

Receipts.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Expenditure.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1940 ..	5,01,422 1 2			Investments Fluctuation Account:—		
Less—Payments to subscribers who have resigned in 1939-1940	5,454 13 1	4,95,967 4 1		Net depreciation in Market Value of Securities		14,271 3 0
Subscribers' Contributions	32,236 1 0			Balance:—		
Add—Amount transferred from Indore for the Staff of the Genetics Scheme ..	3,938 9 3			(Securities in Government Papers at Market Value).		
Recoveries against advances	7,534 3 0	43,708 13 3		3½% Government of India Defence Bonds, 1946, of the Face Value of Rs. 2,27,300	2,30,567 7 0	
		5,39,676 1 4		3% Government of India Loan, 1951-54, of the Face Value of Rs. 32,000	31,840 0 0	
Less—Refunds to Subscribers who have resigned	16,756 10 2			3½% Government of India Loan, 1947-50, of the Face Value of Rs. 1,20,000	1,22,925 0 0	
Advances to Subscribers	14,387 14 0	31,144 8 2		4% Government of India Loan, 1960-70, of the Face Value of Rs. 32,600	35,493 4 0	
		5,08,531 9 2		2½% Government of India Loan, 1948-52, of the Face Value of Rs. 70,000	67,900 0 0	
Committee's Contributions received from Indian Central Cotton Committee ..	32,236 1 0				4,88,725 11 0	
Add—Amount transferred from Indore for the Staff of the Genetics Scheme ..	3,885 3 3	36,121 4 3		Savings Bank Account with the Imperial Bank of India, Bombay	9,301 2 0	
		5,44,652 13 5		Current Account with the Imperial Bank of India, Bombay	38,645 13 3	5,36,672 10 3
Less—Payments made to Subscribers who have resigned, including transfers to "Lapses and Forfeitures" Account for contributions disallowed ..		16,295 11 5				
Interest received on Investments ..	19,321 3 5		5,28,357 2 0			
Interest received on Advances to Subscribers	272 6 8					
Refund of Income Tax deducted on Interest received during 1939-40 ..	258 5 0	19,851 15 1				
Carried over ..		19,851 15 1	5,28,357 2 0	Carried over		5,50,943 13 3

PROVIDENT FUND ACCOUNT AS AT 31st MARCH, 1941—*concld.*

Receipts.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Expenditure.	Rs. a. p.	Rs. a. p.
Brought forward	19,851 15 1	5,28,357 2 0		Brought forward		5,50,943 13 3
.. .. ..						
Less—Interest paid during the year to subscribers who have resigned :—						
On their own contributions	241 3 0					
On Committee's contributions ..	239 2 1					
Interest paid in advance at the time of purchase of Government Securities (since received)	1,373 0 5					
Income Tax deducted from Interest on Investments (recoverable) ..	1,725 5 7			.. ..		
Withdrawal Charges for securities redeemed	147 2 0					
Bank's Commission for Collection of Interest and cost of Stamps ..	47 9 0			.. ..		
.. ..		3,773 6 1	16,078 9 0	.. ..		
Lapses and Forfeitures Account ..			106 5 4			
Amount due to Subscribers resigned but remained unpaid during the year :—				.. ..		
Mr. S. R. Bagde		4,415 2 0		.. ..		
Mr. N. Sreenivas		1,984 10 11		.. ..		
			6,399 12 11			
Total ..			5,50,943 13 3	Total ..		5,50,943 13 3

Examined and found correct.

(Sd.) S. B. Billimoria & Co.,
Registered Accountants, Auditors.

Bombay, *4th June* 1941.

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941.

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
II. Technological Research.—	Rs. a. p.			Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(1) Technological Laboratory:—					..	..			
(*a*) Capital Expenditure	5,86,159 14 2	Permanent.	1923	5,86,050 14 2	4,07,988 14 6	1,78,061 15 8	..	..	
(*b*) Working Expenses ..	25,68,852 15 7	Permanent.	Jan. 1924 ..	25,10,412 15 11	..	..	57,791 12 0	24,52,621 3 11	
(2) Provincial:—					..	..			
(*a*) Capital	8,211 0 0	Permanent.	April 1928 ..	1,77,192 1 9	..	7,711 11 1	..	..	* Provisional figure.
(*b*) Working	1,69,480 6 8	Permanent.	April 1928 ..	1,77,192 1 9	..	..	* 5,474 15 5	1,64,005 7 3	* Provisional figure.
(3) Investigation for improvement in ginning of Indian cottons:—									
(*a*) Capital	30,500 0 0			28,618 6 9	10,447 2 0	18,171 4 9	..	..	
(*b*) Working	13,800 0 0			996 1 9	..	..	..	996 1 9	
(4) Development of Alternative uses for Indian Cotton:—									
(*a*) Capital	50,000 0 0	..	..	4,665 2 6	..	4,665 2 6	..	..	
(*b*) Working	31,087 4 11	..	..	31,087 4 11	..	..	..	31,087 4 11	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31st MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
AGRICULTURAL RESEARCH —GRANTS IN AID.	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Research Schemes.									
Bombay :—									
1. Surat, Physiological ..	2,91,445 0 0	10 1½	Sept. 1923 ..	2,50,954 2 11	..	..	23,334 5 2	2,27,619 13 9	Physiological scheme closed down on 4th August 1932 and writing up scheme on 17th October 1933.
„ Writing-up									
2. (*a*) Surat-Boll-worm ..	1,20,720 0 0	7 7	Sept. 1923 ..	1,14,509 9 7	..	..	4,707 8 7	1,09,802 1 0	Scheme closed down on 31st March 1931.
(*b*) Surat-Boll-worm writing up	2,420 0 0	0 4	July 1932 ..	2,315 3 0	..	..	..	2,315 3 0	
(*c*) Surat Boll-worm Propaganda and clean-up ..	1,28,764 0 0	4 0	1st April 1931	91,468 9 2	..	..	10,828 0 11	80,640 8 3	
3. (*a*) Dharwar Wilt and Cotton Breeding	2,63,545 0 0	8 11	Sept. 1923	1,82,836 4 11	..	..	13,713 3 7	1,69,123 1 4	Schemes closed down on 31st July 1932 and in July 1929.
(*b*) Dharwar Wilt and Cotton Breeding Writing up	11,355 0 0	0 10	1-6-1932 ..	10,902 10 3	..	..	..	10,902 10 3	Scheme closed down on 31st March 1933.
4. Khandesh Cotton Breeding	27,995 0 0	5 5½	15-10-1926 ..	26,573 5 0	..	..	..	26,573 5 0	Scheme closed down on 31st March 1932.
5. Co-ordination of Cotton Research	23,991 0 0	..	not started	1,749 7 6	..	..	..	1,749 7 6	
6. Jalgaon Cotton Breeding ..	76,061 0 0	10 0	1-4-1932 ..	62,672 2 9	..	..	1,408 10 6	61,263 8 3	
	A 18,787 0 0	5 0							*A*. On 50 : 50 basis.

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
Bombay—contd.	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
7. Broach Cotton Breeding	1,20,910 0 0 *A* 29,180 0 0	10 0 5 0	1-4-1932 ..	84,172 11 5	..	..	1,045 7 8	83,127 3 9	*A* On 50 : 50 basis.
8. Small leaf Disease Survey	5,118 0 0	1 0	6-11-1933 ..	3,938 9 6	..	..	495 2 6	3,443 7 0	Scheme closed down on 31ct October 1934
9. Survey of Goghari Cotton in Gujerat	5,000 0 0	5 0	16-1-1935 ..	4,199 5 0	..	..	..	4,199 5 0	Scheme closed down on 31st March 1939.
10. Defibration of Cotton Seed— (*a*) Recurring .. .. (*b*) Non-recurring	5,250 0 0 3,700 0 0	3 0	1-2-1936 ..	4,878 5 9	..	3,697 7 10	39 10 1	1,141 3 10	
11. Plant Puller Propaganda in Surat, Broach and Panch Mahals Districts.	42,524 0 0	7 0	March 1934 ..	21,578 2 9	..	..	812 0 6	20,766 2 3	This continuation scheme is financed partly from the savings of the Surat Clean-up Scheme. Scheme closed down on 31st May 1940.
12. Estimation of effects on Cotton crop of use of Plant Pullers.	4,738 0 0	2 0	1-12-1936 ..	4,143 12 5	..	..	2 4 0	4,141 8 5	Scheme closed down on 31st May 1938.
13. Breeding of Wilt Resistant Cotton for Surat Area.	14,385 0 0	5 7	1-4-1937 ..	9,520 8 3	..	..	381 5 9	9,139 2 6	
14. Cotton Wilt Breeding Scheme, Poona.	42,350 0 0 52,057 0 0	5 0 5 0	1-4-1937 ..	32,145 13 0	..	..	5,049 0 9	27,096 12 3	
15. Inclusion of Northerns and Westerns Cottons in Programme of Dry Farming Scheme, Bijapur.	7,908 0 0	4 0	1-6-1937 ..	7,135 14 7	..	..	1,093 1 9	6,042 12 10	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31st MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
Bombay—concld.	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
16. Inter-specific Hybridisation in cotton at Surat.	40,059 0 0	5 0	1-11-1938 ..	16,000 15 0	..	..	4,059 1 11	11,941 13 1	
17. Improvement of Cotton crop in Kaira District.	13,880 0 0	5 0	22-9-1941 ..	..	..	..	..	..	
18. Improvement of Dholleras Cottons—Wagad Cotton at Viramgam.	27,110 0 0 38,748 0 0	5 0 5 0	1-5-1937 ..	19,006 7 8	..	..	1,369 9 11	17,636 13 9	
19. Model Project for extension of improvements in cultivation of crops in Surat District.	2,456 0 0	3 0	2-6-1941 ..	..	..	..	..	..	
20. Improvement of Dharwar-American Cotton in Kannada Districts.	13,890 0 0	5 0	..	..	..	..	..	..	
Madras :—									
(*a*) Herbaceum	1,47,068 0 0	14 6	1-12-1923 ..	1,42,466 13 1	..	..	4,431 7 0	1,38,035 6 1	Scheme closed down on 31st May 1938.
(*b*) Pempheres and Physiological.	2,12,779 0 0	11 7¼	16-9-1931 ..	1,85,153 5 4	..	..	4,928 2 9	1,80,225 2 7	
(*c*) Fodder Cholam :—									
(*i*) Capital	900 0 0	6 5	14-1-1931 ..	19,517 9 4	..	881 11 7	..	..	Scheme closed down on 14th June 1937.
(*ii*) Recurring	21,010 0 0				..	..	291 3 4	18,344 10 5	
(*d*) Breeding of Nadam Cotton..	18,203 0 0	8 0	14-6-1933 ..	17,217 14 7	..	..	442 5 6	16,775 9 1	
(*e*) Improvement of Mungari Cotton.	23,534 0 0	5 0	24-5-1937 ..	15,928 0 6	..	..	149 1 8	15,778 14 10	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
Madras—contd.	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(*f*) Improvement of Cocanadas Cotton.	35,309 0 0	5 0	1-2-1940 ..	5,964 5 0	..	..	358 15 3	5,605 5 9	
(*g*) Investigation of possibilities of control of Cotton Stem Weevil of South India.	6,260 0 0	1 3	30-10-1939 ..	6,230 6 0	..	..	80 10 0	6,149 12 0	Scheme closed down on 29-1-1941.
Punjab :—									
(*a*) Botanical:—									
(*i*) Capital	31,330 0 0	20 7½	13-8-1925 ..	5,89,099 10 9	22,158 0 0	9,102 11 0	..	..	
(*ii*) Working Expenses ..	7,98,268 0 0				..	..	35,867 3 6	5,21,971 12 3	Rs. 2,030 transferred to Capital.
(*b*) Entomological:—									
(*i*) Capital	6,000 0 0	11 11	4-5-1926 ..	2,25,908 7 11	..	5,826 3 10	..	..	Scheme closed down on 31st March 1938.
(*ii*) Working Expenses (Pink & Spotted Bollworm).	2,49,646 0 0				..	..	6,367 4 11	2,13,714 15 2	
(*c*) White Fly	56,087 0 0	5 5	1-5-1931 ..	48,721 4 1	..	..	6,762 15 0	41,958 5 1	Scheme closed down on 30th Sept. 1936.
(*d*) Root Rot:—									
(*i*) Non-recurring	3,000 0 0	9 6	1-9-1932 ..	66,457 9 10	..	..	507 10 6	65,949 15 4	
(*ii*) Recurring	69,129 0 0								
(*e*) Spraying Trials	14,400 0 0	..	8-7-1933 ..	10,191 13 6	..	..	2,372 2 3	7,819 11 3	
(*f*) Physiological (Cotton Failure Research).	3,77,156 0 0	8 0	15-3-1935 ..	2,69,123 9 1	..	..	22,713 14 10	2,46,409 10 3	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.* staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
Punjab—contd.	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(*g*) Clean-up Campaign ..	64,580 0 0	3 5	1-4-1937 ..	59,756 5 3	..	..	10,206 12 2	49,549 9 1	Scheme closed down on 30th April 1940.
(*h*) Defibration and Delinting:–									
(*i*) Recurring	1,000 0 0	2 0	..	6,112 8 9	..	..	17 12 0	222 2 9	
(*iii*) Non-recurring ..	6,700 0 0				..	5,872 10 0	..	..	
(*i*) Survey of disease of malformation	2,674 0 0	0 10	1-6-1934 ..	1,730 10 6	..	..	..	1,730 10 6	Scheme closed down on 31st March 1935.
(*j*) Cotton Jassid Investigation	18,673 0 0	6 0	1-4-1937 ..	11,101 7 6	..	..	345 6 3	10,756 1 3	
(*k*) Improvement of Punjab-American 289F cotton.	14,000 0 0	5 0	9-7-1938 ..	7,197 5 0	..	..	291 10 3	6,905 10 9	
Central Provinces & Berar :—									
(*a*) Botanical	61,000 0 0	2 6	Oct. 1923	4,93,449 9 4	..	..	6,164 9 10	5,05,642 5 3	The balance of this amounting to Rs. 3,100-13-5 lapsed on revision.
(*b*) Cotton Breeding	5,36,150 0 0	13 0	1-4-1926						
	68,292 0 0	5 0	1-4-1939	18,357 5 9					
(*c*) Entomological	13,131 0 0	3 3	2-7-1934 ..	12,344 13 6	..	..	59 10 6	12,285 3 0	Scheme closed down on 30th Sept. 1937.
(*d*) Investigation of Heliothis Obsoleta.	3,000 0 0	1 5	25-6-1939	1,698 14 0	..	..	124 8 3	1,574 5 9	
(*e*) Model Projects for extension of improvements in cultivation of crops.	2,298 0 0	3 0	not started	..	..	..	..	..	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
United Provinces :—	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(*a*) Pink Boll-worm :—									
(*i*) Capital	54,000 0 0	8 0	July 1923	1,46,646 13 10	..	49,511 5 6	3,065 4 3	94,070 4 1	Scheme closed down on 31st July 1931. Scheme closed down on 12th July 1934.
(*ii*) Working Expenses ..	56,000 0 0				..	..			
(*iii*) Recurring grant for staff.	44,475 0 0	7 9½	1-10-1926						
(*b*) Rohilkhand and Bundelkhand Cotton Survey.	19,000 0 0	3 8	1-7-1933	18,061 14 4	..	..	1,529 12 1	16,532 2 3	Scheme closed down on 1st March 1937.
(*c*) Botanical	91,380 0 0	5 0	22-8-1938	40,137 7 9	..	..	7,776 1 0	32,361 6 9	
(*d*) Model Projects for extension of improvements in cultivation of crops.	3,192 0 0	5 0	not started	..	..	..	..	..	
Sind :—									
(*a*) Physiological	2,74,346 0 0	11 4	10-7-1927	2,63,945 12 10	..	..	17,370 11 9	2,46,575 1 1	Scheme closed down on 30th June 1937.
(*b*) Jassid Investigation ..	26,141 0 0	7 0	9-5-1938 ..	7,454 13 1	..	..	164 6 0	7,290 7 1	
(*c*) Investigation into Black-headed cricket.	13,980 0 0	3 0	30-9-1938 ..	9,245 1 3	..	..	251 8 6	8,993 8 9	
(*d*) Scheme for Production of Long Staple Cotton.	2,21,140 0 0	5 0	19-4-1940 ..	27,728 13 3	..	..	4,775 3 6	22,953 9 9	
(*e*) Boll-worm Investigation and Clean-up Campaign.	83,800 0 0	3 6	1-9-1940 ..	6,837 7 0	..	..	958 8 6	5,878 14 6	
Sind and Baluchistan :— Co-ordination scheme for research on Black-headed Cricket in Sind and Baluchistan.	37,980 0 0	3 0	1-4-41 ..	..	..	..	..	..	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31st MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Bengal:—									
(*a*) Comilla Cotton	38,658 0 0	7 4	1-12-1934	30,513 9 9	—	—	1,141 3 9	29,372 6 0	
(*b*) Cultivation of Long Staple Cotton-Provision for a Supervising officer.	8,360 0 0	2 0	1-8-1941	—	—	—	—	—	
Baluchistan:—									
Co-ordination of Research Work on Black-headed Cricket in Sind and British Baluchistan.	3,920 0 0	2 0	11-6-1940 ..	1,394 10 0	—	—	—	1,394 10 0	
Burma:—									
(*a*) Capital	3,000 0 0	—	—	2,906 15 5	..	2,906 15 5	..	..	
(*b*) Cotton Improvement	49,032 0 0	6 0	1-4-1931 ..	47,790 3 9	..	..	4,234 5 0	43,555 14 9	Scheme closed down on 31st March 1937.
Indore:—									
(*a*) Institute of Plant Industry									
(*i*) Capital	2,83,535 12 10	Permanent.	Oct. 1924 ..	18,96,943 12 0	2,12,552 11 5	70,983 1 5	..	..	
(*ii*) Working Expenses	16,13,407 15 2				..	..	31,857 4 4	15,81,550 10 10	
(*b*) Cotton Genetics Research	71,180 0 0	2 0	1-4-1940 ..	34,614 2 3	..	..	328 6 9	33,785 11 6	
	2,41,241 0 0	5 0							

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31st MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, i.e., staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3.	4	5	6.	7.	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Hyderabad: —									
(*a*) Botanical	4,92,969 0 0	14 11	10-5-1929 ..	3 64,375 2 3	..	..	*20,174 12 10	3,44,200 5 5	
(*b*) Cotton Survey	39,165 0 0	5 0	28-6-1931 ..	36,578 3 0	..	..	187 11 10	36,390 7 2	Scheme closed down on 27th June 1936.
(*c*) Pink and Spotted Boll-worm and clean-up campaign.	1,51,018 0 0	7 10	1-6-1933 ..	1,37,915 12 10	..	..	*1,167 8 10	1,36,748 4 0	
(*d*) Improvement of Kumpta Cotton.	32,542 0 0	5 0	28-11-1937 ..	19,043 7 7	..	..	*642 15 10	18,400 7 9	
(*e*) Inclusion of Northerns and Westerns in programme of Dry Farming Research, Raichur.	2,037 0 0	4 7	1-9-1937 ..	1,543 0 0	..	..	..	1,543 0 0	*Provisional figures.
(*f*) Improvement of Cottons of Oomras tract.	60,412 0 0	5 0	8-10-1941 ..	..	..	..	..	..	
Baroda:—									
(*a*) Root Rot:—									
(*i*) Capital	4,000 0 0	10 4	1-2-1932 ..	82,145 9 2	3,046 1 7	..	..	..	
(*ii*) Recurring Expenses ..	91,569 0 0				..	..	9,847 6 0	69,252 1 7	
(*b*) Comparative tests of 1027 A. L. F. and 1A Cottons.	4,280 0 0	1 2	1-4-1932 ..	4,251 5 3	..	..	145 11 6	4,105 9 9	Scheme closed down on 15th June 1933.
(*c*) Survey of Goghari cotton ..	5,000 0 0	5 0	1-2-1935 ..	3,891 14 7	..	..	..	3,891 14 7	Scheme closed down on 31st May 1938.

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
Baroda—contd.	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(*d*) Plant Puller Propaganda ..	41,853 0 0	6 0	1-1-1936 ..	30,048 9 3	..	..	585 14 0	29,462 11 3	Scheme closed down on 30th June 1941.
(*e*) Improvement of Dholleras Cottons-Mathio cotton at Amreli and Jagudan.	21,570 0 0	5 0	4-6-1937 ..	13 752 0 5	..	..	1,067 9 11	12,684 6 6	
Bikaner :—									
Bengals Cotton Improvement:									
(*i*) Capital	14,500 0 0	15 0	1-1-1931 ..	62,012 13 2	8,584 6 9	3,835 5 0	..	..	
(*ii*) Working	81,091 0 0				..	..	1,766 11 0	47,826 6 5	
Mysore (Doddahathi) Cotton ..	30,616 0 0	9 0	1-11-1935 ..	13,983 3 6	..	..	172 3 0	13,811 0 6	
Cutch :—									
Improvement and development of Cotton.	40,790 0 0	5 0	not started	..	..	..	..	..	
Collections of Herbaceum Cottons in Iran.	4,000 0 0	..	31-8-1936 ..	3,121 12 0	..	..	..	3,121 12 0	
Improvement of Dholleras Cottons-Preliminary trials at Nawanagar.	900 0 0	0 4	1-6-1936 ..	323 12 4	..	..	..	323 12 4	
Marketing Schemes :—									
Bombay :—									
Scheme for grading and marking of 1027 A. L. F. Cotton in Surat Area.	*2,532 0 0 *1,693 0 0	1 0	17-1-1941 ..	..	..	..	..	..	*On 50 : 50 basis.

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*).

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Madras :—									
Cotton Marketing Survey in Madras Province.	7,792 0 0	1 4	..	..	..	..	..	..	
Punjab :—									
Cotton Marketing Survey in the Punjab.	7,634 0 0	1 5	16-9-1938 ..	7,214 1 6	..	..	79 9 0	7,134 8 6	Scheme closed down on 15th Feb. 1940.
Central Provinces & Berar :—									
(*a*) Extension and Marketing of V.434.	2,18,819 0 0 33,725 0 0 71,578 0 0	5 2¼ 3 0 3 0	1-4-1934 ..	2,91,534 4 7	..	..	330 0 0	2,91,204 4 7	Committee bears 75% of the cost of staff from 1st March 1939.
(*b*) Verum Cotton	1,17,900 0 0	3 8	1st Sept. 1930	73,544 2 5	..	..	..	73,544 2 5	Scheme closed down on 30th April 1934.
(*c*) Distribution and Marketing of Buri 107 Cotton in Burhanpur Tehsil.	15,300 0 0 1,316 0 0 10,606 0 0	5 0	March 1939 ..	12,161 9 0	..	..	..	12,161 9 0	
Baroda :—									
(*a*) Marketing of 1027 A. L. F. Cotton in Baroda State.	12,910 0 0	5 0	1-2-1938 ..	7,408 14 10	..	..	..	7,408 14 10	
(*b*) Cotton Marketing Survey in Gujarat, Kathiawar and South Rajputana.	11,108 0 0	1 4	..	..	..	..	..	..	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
SEED DISTRIBUTION AND EXTENSION SCHEMES.									
Bombay Province :—									
(*i*) Hubli	50,110 0 0	6 0	June 1930 ..	44,048 8 3	..	..	5 14 0	44,042 10 3	Schemes closed down on the 31st May, 1936.
(*ii*) Gadag	54,545 0 0	6 0	June 1930 ..	41,700 15 1	..	..	..	41,700 15 1	
(*iii*) Gadag (Supplementary)	21,448 0 0	4 0	10th June 1931	20,167 11 4	..	..	2,929 5 6	17,238 5 10	Scheme closed down on 10th June, 1935.
(*iv*) Haveri	27,752 0 0	5 0	..	..	..	..	..	..	Scheme did not start.
(*v*) Athani	46,757 0 0	5 0	5th April 1932	18,086 1 7	..	..	1,722 15 6	16,363 2 1	Scheme closed down on 31st May, 1936.
(*vi*) Bailhongal	27,425 0 0	5 0	..	..	..	..	..	..	Scheme did not start.
(*vii*) Surat:—									
(*a*) 1027 A. L. F. ..	1,18,410 0 0	13 0	1st April 1930	80,842 15 10	..	..	..	80,842 15 10	Committee bears 75% of the cost of staff from 1-4-1939.
(*b*) Selection 1A ..	7,272 0 0	3 0	1st Feb. 1940	1,632 0 0	..	..	..	1,632 0 0	Receipts amounting to Rs. 1,10,000 anticipated in the scheme. The grant of Rs. 20,787, for the extended period takes into account anticipated receipts amounting to Rs. 6,000. This scheme closed down on the 30th April, 1937.
(*viii*) Khandesh (Banilla) ..	2,70,340 0 0 20,787 0 0	5 0 1 0	1st May 1931	1,63,525 14 6	..	..	9,032 14 0	1,54,493 0 6	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*contd.*)

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(*ix*) Khandesh (Jarila) ..	*E* 24,828 0 0 77,297 0 0 1,50,546 0 0	1 10 3 0 5 0	1st May 1937	61,082 11 9	..	..	8,735 3 11	52,347 7 10	Committee bears from 1-3-1939 cost of staff only and from 1-3-1942 the 75% of the cost of staff. *E.* Excludes anticipated receipts amounting to Rs. 6,500.
(*x*) Deccan Canals (Banila).	*B* 24,465 0 0 1,313 0 0	5 0 5 0	1-4-1934 ..	2 964 14 7	..	..	11 1 6	2,953 13 1	*B.* The scheme was expected to be self-supporting but due to low prices the full receipts anticipated were not realised.
(*xi*) B. D. 8	47,501 0 0	8 0	1st Dec. 1935	24,504 9 0	..	..	182 3 0	24,322 6 0	Committee meets 75% of the cost of staff from 1-12-1940.
(*xii*) Revised Jayawant and Gadag No. 1.	*C* 2,66,772 0 0 *D* 10,084 0 0 40,729 0 0	5 0 1 0 4 0	1st June 1936	1,38,249 12 4 43,192 0 9	.. ..	.. ..	144 7 6 28 6 0	1,38,105 4 10 *P* 43,163 10 9	*C.* This grant is subject to the condition that the Bombay Govt. bears 25% of the net cost calculated after deducting total savings under the Hubli, Gadag, Athani, Haveri and Bailhongal schemes. *D.* The Committee bears 15% of the cost of scheme during the extension period.
(*xiii*) Maintenance of nucleus of pure seed of improved varieties of cotton.	13,300 0 0	5 0	Sept. 1937 ..	7,653 2 0	..	..	35 8 0	7,617 10 0	*P.* Provisional figure.

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—*(contd.)*

Major Heads.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, i.e., staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	Remarks.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Madras:—									
(*i*) Pay and allowance of Business Manager, Tiruppur.	24,940 0 0	6 4	18th May 1931	24,079 13 0	..	..	162 4 0	23,917 9 0	Scheme closed down on 17th August, 1937.
(*ii*) Co. 2	1,310 0 0	6 0	15th Sept. 1932	41,286 2 9	..	..	83 13 0	41,202 5 9	† Not yet started.
†	63,357 0 0	4 5							
(*iii*) (*a*) H. 1	18,860 0 0	2 0	6-5-1933 ..	3,952 2 9	..	..	..	3,952 2 9	Scheme closed down on 16th July, 1934.
(*b*) H. 1 strain in the Westerns Area.	43,254 0 0	5 0	..	..	..	..	..	..	
(*iv*) Maintenance of nucleus of pure seed of improved varieties of Cotton.	3,050 0 0	5 0	12-9-1938 ..	1,746 6 5	..	..	..	1,746 6 5	
Punjab-Lyallpur (Ginnery) ..	18,125 0 0	..	..	16,038 3 3	9,221 5 0	6,816 14 3	..	..	P. Provisional figure.
Sind:—									
(*i*) Seed Distribution and Extension scheme.	4,34,302 0 0	10 0	1-4-1931	3,99,598 14 4	..	..	6,422 5 6	P 3,93,176 8 10	The Committee bears 75% of cost of staff from 1-4-39 and 15% of the cost of this scheme during the extension for 5 years from 1-4-1941.
	42,471 0 0	5 0							
(*ii*) Maintenance of nucleus of pure seed of improved varieties of Cotton.	12,500 0 0	5 0	1-4-1938 ..	7,499 11 8	..	..	2 0 0	7,497 11 8	
(*iii*) Financing of Seed Distribution.	1,35,000 0 0	3 0	..	..	..	..	..	..	

STATEMENT SHOWING EXPENDITURE ON THE SCHEMES FINANCED BY THE COMMITTEE UP TO 31ST MARCH, 1941—(*concld.*)

MAJOR HEADS.	Total sanctioned grant.	Period.	Date of starting of the scheme.	Total expenditure up to 31st March, 1941.	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of a permanent or semi-permanent nature and live-stock.	Net working expenses, *i.e.*, staff, field experiments, labour, stores, laboratory and field contingencies including petty apparatus.	REMARKS.
					Lands and Buildings.	Machinery, apparatus and other movable property.			
1	2	3	4	5	6	7	8	9	10
	Rs. a. p.	Yrs. Mths.		Rs a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Central Provinces and Berar—Maintenance of nucleus of pure seed of improved strains of Cotton.	7,000 0 0	5 0	April, 1939 ..	2,384 7 9	..	..	16 14 0	2,367 9 9	
Hyderabad—Seed Distribution and Extension Scheme.	35,466 0 0 *G*25,799 0 0	6 6 4 6	1-3-1930 ..	53,471 6 3	..	..	..	*P* 53,471 6 3	*G.* The amount represents the Committee's share of expenditure which is borne on 50 : 50 basis between the Hyderabad State and the Committee.
Baroda :—									
(*i*) Navsari Seed Storage Scheme.	55,488 0 0	10 0	16th April 1934	20,115 15 7	..	..	446 12 0	19,669 3 7	*P.* Provisional figures.
(*ii*) B. D. 8	17,300 0 0	5 0	1-4-1939 ..	5,662 15 5	..	..	..	5,662 15 5	
United Provinces—C. 402 ..	45,800 0 0	5 0	1st May 1935	18,616 11 6	..	..	300 0 0	18,316 11 6	Scheme closed down on 15th Feb. 1938.

APPENDIX

RECEIPTS AT MILLS IN INDIA OF RAW

(*Compiled from voluntary*

1st September, 1940 to

(*In thousand bales**

Trade Descriptions of Cotton.	Bombay Island.	Ahmedabad.	Rest of Bombay Province.	Total Bombay Province.	Madras Province.	United Provinces.	C. P. & Berar.	Bengal.	Punjab and Delhi.	Rest of British India.
BENGALS—										
U. P. Deshi	6	5	—	11	—	102	—	17	9	2
Punjab Deshi	29	—	2	31	—	35	—	12	75	7
Sind Deshi	3	2	1	6	—	—	—	—	—	1
Rajputana Deshi	6	3	—	9	—	1	—	—	—	23
Total ..	44	10	3	57	—	138	—	29	84	33
AMERICANS—										
Sind Sudhar—(289-F-1) ..	50	28	4	82	6	—	—	—	—	—
Sind—289-F-types (other than 289-F-1)	88	18	3	109	11	—	1	5	—	—
Sind—98	15	3	—	18	8	—	—	—	—	—
Sind—4-F (Ordinary)	37	1	1	39	40	—	—	2	—	—
Punjab—289-F/K.25	21	4	2	27	13	8	—	9	5	1
Punjab—289-F/43	22	4	—	26	1	20	—	8	—	—
Punjab—L. S. S.	9	—	1	10	1	24	1	18	15	2
Punjab—(Unspecified-4-F) ..	78	3	1	82	16	210	—	37	95	8
Buri	1	—	—	1	1	—	8	3	—	—
Dharwar (Gadag 1)	15	1	10	26	—	—	—	—	—	—
Dharwar (Upland-Unspecified),	6	—	3	9	—	—	—	—	—	—
Cambodia (Co.3 & Co.4)	—	—	—	—	18	—	—	—	—	—
Cambodia (Co.2)	2	1	—	3	139	—	—	—	—	—
Cambodia (Unspecified) ..	10	1	1	12	69	—	—	5	—	2
Total ..	354	64	26	444	323	262	10	87	115	13
OOMRAS—										
C. P. and Nimar Oomras ..	51	3	2	56	10	8	72	6	—	1
Berar Oomras	50	9	5	64	1	4	64	6	—	—
C. P. and Berar Verum ..	32	7	1	40	3	2	13	9	—	1
Khandesh Oomras	17	8	4	29	1	—	—	—	—	—
Jarila (Khandesh)	46	18	6	70	1	—	3	—	—	—
Khandesh Banilla	2	2	37	41	1	—	—	—	—	—
Barsi-Nagar Oomras	9	—	39	48	—	—	—	—	—	—
Hyderabad Oomras	25	2	36	63	1	2	3	—	—	—
Total ..	232	49	130	411	18	16	155	21	—	2
HYDERABAD GAORANI	25	1	34	60	17	—	21	—	—	—
CENTRAL INDIA—										
Malvi	16	12	—	28	—	11	1	—	—	3
Central India—Others	27	8	4	39	10	21	—	2	—	—
Total ..	43	20	4	67	10	32	1	2	—	3
BROACH	132	66	4	202	8	—	—	2	—	—
SURTI	96	58	1	155	1	—	1	—	—	—

* Standard Indian bales of approximate average gross weight

III.

COTTON CLASSIFIED BY VARIETIES.

returns furnished by mills.)

31st August, 1941.

of 400 lbs. each.)

Total British India.	Hyderabad.	Mysore.	Baroda.	Gwalior.	Indore.	Kathiawar States.	Other Indian States.	Pondicherry.	Total Indian States.	GRAND TOTAL.	Trade Descriptions of Cotton.
											BENGALS—
141	—	2	—	13	—	—	3	—	18	159	U. P. Deshi.
160	—	—	—	1	—	—	4	—	5	165	Punjab Deshi.
7	—	—	—	9	—	—	—	—	9	16	Sind Deshi.
33	—	—	—	1	1	—	8	—	10	43	Rajputana Deshi.
341	—	2	—	24	1	—	15	—	42	383	Total.
											AMERICANS—
88	—	—	—	—	—	—	2	—	2	90	Sind Sudhar—(289-F-1).
											Sind—289-F-types (other than
126	—	—	1	—	1	—	—	—	2	128	289-F-1).
26	—	—	—	—	—	—	2	—	2	28	Sind—98.
81	—	—	1	—	—	—	3	7	11	92	Sind—4-F (Ordinary).
63	—	—	2	2	1	—	—	—	5	68	Punjab—289-F/K.25.
55	—	—	2	—	—	—	1	—	3	58	Punjab—289-F/43.
71	—	—	—	7	—	—	1	—	8	79	Punjab—L. S. S.
448	—	—	—	19	—	—	11	3	33	481	Punjab (Unspecified-4-F).
13	—	—	—	1	—	—	—	—	1	14	Buri.
26	—	2	—	—	—	—	—	—	2	28	Dharwar (Gadag 1).
9	—	1	—	—	—	—	—	1	2	11	Dharwar (Upland-Unspecified).
18	—	—	—	—	—	—	1	—	1	19	Cambodia (Co.3 & Co.4).
142	—	1	—	—	—	—	4	—	5	147	Cambodia (Co.2).
88	—	2	1	2	—	—	3	—	8	96	Cambodia (Unspecified).
1,254	—	6	7	31	2	—	28	11	85	1,339	Total.
											OOMRAS—
153	—	2	—	1	11	—	12	1	27	180	C. P. and Nimar Oomras.
139	—	—	1	1	5	—	2	—	9	148	Berar Oomras.
68	—	—	1	—	3	—	1	—	5	73	C. P. and Berar Verum.
30	—	—	4	1	—	—	1	—	6	36	Khandesh Oomras.
74	—	—	2	1	1	2	1	—	7	81	Jarila (Khandesh).
42	—	—	—	—	—	—	—	1	1	43	Khandesh Banilla.
48	—	—	—	—	—	—	1	—	1	49	Barsi-Nagar Oomras.
69	38	—	—	—	—	—	4	—	42	111	Hyderabad Oomras.
623	38	2	8	4	20	2	22	2	98	721	Total.
98	37	2	—	—	—	—	—	1	40	138	HYDERABAD GAORANI.
											CENTRAL INDIA—
43	—	—	23	36	69	—	16	—	144	187	Malvi.
72	—	—	2	2	71	—	4	—	79	151	Central India—Others.
115	—	—	25	38	140	—	20	—	223	338	Total.
212	—	—	18	—	3	2	—	—	23	235	BROACH.
157	—	—	16	—	—	13	—	1	30	187	SURTI.

400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

APPENDIX

RECEIPTS AT MILLS IN INDIA OF RAW

(*Compiled from voluntary*
1st September, 1940 to
(*In thousand bales**

Trade Descriptions of Cotton.	Bombay Island.	Ahmedabad.	Rest of Bombay Province.	Total Bombay Province.	Madras Province.	United Provinces.	C. P. & Berar.	Bengal.	Punjab and Delhi.	Rest of British India.
DHOLLERAS—										
Gujerat—Dholleras	8	47	—	55	—	—	—	—	—	—
Gujerat—Short staple	11	34	2	47	—	—	—	—	—	—
Kathiawar—Dholleras ..	3	17	—	20	—	—	—	—	—	—
Kathiawar—Short staple ..	19	10	4	33	—	—	—	—	—	—
Cutch—Dholleras	—	1	—	1	—	—	—	—	—	—
Total ..	41	109	6	156	—	—	—	—	—	—
SOUTHERNS—										
Kumptas (Jayawant)	75	4	14	93	4	—	—	—	—	—
Kumptas (Unspecified) ..	41	—	16	57	1	—	—	—	—	—
Bijapur and Bagalkot Jowari.	17	1	60	78	1	—	—	—	—	—
Madras Westerns—Hagari-1 ..	5	3	4	12	16	—	—	1	—	—
Madras Westerns (Ordinary) ..	18	7	2	27	19	1	—	10	—	—
Hyderabad Westerns	—	2	12	14	2	—	—	—	—	—
White and Red Northerns ..	1	1	1	3	13	—	—	2	—	—
Warangal and Cocanadas ..	—	1	—	1	6	—	—	4	—	—
Chinnapathi (Short staple) ..	—	—	—	—	1	—	—	—	—	—
Total ..	157	19	109	285	63	†1	—	17	—	—
TINNEVELLIES (including Karungannies)—										
Tinnevellies	—	—	—	—	68	—	—	1	—	—
Karungannies	6	1	—	7	73	—	—	2	—	—
Total ..	6	1	—	7	141	—	—	3	—	—
SALEMS	1	—	—	1	14	—	—	—	—	—
COMILLAS	—	—	—	—	—	—	—	1	—	—
Total Indian Cotton ..	1,131	397	317	1,845	595	449	188	162	199	51
AMERICANS	13	3	1	17	1	—	—	2	—	—
EGYPTIANS	23	77	5	105	19	—	1	7	1	—
EAST AFRICANS	70	115	13	198	6	—	2	10	1	—
OTHERS (Sudan, Burma, etc.) ..	97	31	5	133	19	—	4	4	—	—
Total Foreign Cotton ..	203	226	24	453	45	—	7	23	2	—
GRAND TOTAL ..	1,334	623	341	2,298	640	449	195	185	201	51
Indian raw cotton consumed in mills in India. (Figures compiled mainly from returns under the Indian Cotton Cess Act—Bales of 400 lbs. net.)	982	341	256	1,579	526	381	154	118	170	47

* Standard Indian bales of approximate average gross weight

† Included under

III—(*contd.*)

COTTON CLASSIFIED BY VARIETIES.

returns furnished by mills.)
31st August, 1941.
of 400 lbs. each.)

Total British India.	Hyderabad.	Mysore.	Baroda.	Gwalior.	Indore.	Kathiawar States.	Other Indian States.	Pondicherry.	Total Indian States.	GRAND TOTAL.	Trade Descriptions of Cotton.
											DHOLLERAS —
55	—	—	8	—	—	10	—	—	18	73	Gujerat—Dholleras
47	—	—	1	—	—	—	1	—	2	49	Gujerat—Short staple
20	—	—	7	—	—	17	—	—	24	44	Kathiawar—Dholleras
33	—	—	1	—	—	6	—	—	7	40	Kathiawar—Short staple
1	—	—	—	—	—	—	—	—	—	1	Cutch—Dholleras
156	—	—	17	—	—	33	1	—	51	207	Total.
											SOUTHERNS—
97	—	2	4	—	1	—	—	1	8	105	Kumptas (Jayawant).
58	3	21	5	—	—	—	7	—	36	94	Kumptas (Unspecified).
79	—	5	—	—	—	—	—	1	6	85	Bijapur and Bagalkot Jowari.
29	—	9	1	—	—	—	2	—	12	41	Madras Westerns—Hagari-1.
57	—	17	3	—	—	—	—	1	21	78	Madras Westerns (Ordinary).
16	5	3	—	—	—	—	—	—	8	24	Hyderabad Westerns.
18	—	4	—	—	—	—	—	—	4	22	White and Red Northerns.
11	5	1	—	—	—	—	—	—	6	17	Warangal and Cocanadas.
1	—	—	—	—	—	—	—	—	—	1	Chinnapathi (Short staple).
366	13	62	13	—	1	—	9	3	101	467	Total.
											TINNEVELLIES (including Karungannies)—
69	—	—	—	—	—	—	—	—	—	69	Tinnevellies.
82	—	1	—	—	—	—	3	—	4	86	Karungannies.
151	—	1	—	—	—	—	3	—	4	155	Total.
15	—	—	—	—	—	—	—	—	—	15	SALEMS.
1	—	—	—	—	—	—	—	—	—	1	COMILLAS.
3,489	88	75	104	97	167	50	98	18	697	4,186	Total Indian Cotton.
20	—	—	1	—	—	—	—	—	1	21	AMERICANS.
133	—	2	10	—	—	—	2	—	14	147	EGYPTIANS.
217	—	2	17	—	—	5	1	—	25	242	EAST AFRICANS.
160	—	—	4	—	—	—	—	1	5	165	OTHERS (Sudan, Burma, etc.).
530	—	4	32	—	—	5	3	1	45	575	Total Foreign Cotton.
4,019	88	79	136	97	167	55	101	19	742	4,761	GRAND TOTAL.
2,975	73	65	92	96	139	50	108	†	623	3,598	Indian raw cotton consumed in mills in India. (Figures compiled mainly from returns under the Indian Cotton Cess Act—Bales of 400 lbs. net.)

400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.
† Other Indian States.'

APPENDIX IV.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES.

(Compiled from voluntary returns furnished by exporters.)

1st September 1940 to 31st August 1941.

(In thousand bales of 400 lbs. each.)*

Trade Descriptions of Cotton.	Exported to				Total Exports.
	Europe (except United Kingdom) and the West.†	United Kingdom.	Japan.	China and the East (except Japan).	
BENGALS—					
1. U. P. Deshi	—	1	6	1	8
2. Punjab Deshi	29	52	167	11	259
3. Sind Deshi	99	40	1	3	143
4. Rajputana Deshi	—	—	4	—	4
Total	128	93	178	15	414
AMERICANS—					
5. Sind Sudhar (289-F-1)	—	4	2	6	12
6. Sind—289-F types (other than 289-F-1)	—	33	25	87	145
7. Sind—98	—	7	—	1	8
8. Sind—4-F (Ordinary)	—	15	—	15	30
9. Punjab—289-F/K. 25	—	43	2	12	57
10. Punjab—289-F/43	—	1	—	4	5
11. Punjab—L. S. S.	—	3	19	15	37
12. Punjab—(Unspecified—4-F)	—	104	71	143	318
13. Buri	—	—	—	—	—
14. Dharwar (Gadag 1)	—	—	—	—	—
15. Dharwar (Upland—Unspecified)	—	—	1	4	5
16. Cambodia (Co. 3 & Co. 4)	—	—	—	—	—
17. Cambodia (Co. 2)	—	—	—	1	1
18. Cambodia (Unspecified)	—	—	8	1	9
Total	—	210	128	289	627
OOMRAS—					
19. C. P. and Nimar Oomras	—	27	29	27	83
20. Berar Oomras	1	7	251	35	294
21. C. P. and Berar Verum	—	—	18	7	25
22. Khandesh Oomras	—	1	123	16	140
23. Jarila (Khandesh)	—	—	3	4	7
24. Khandesh Banilla	—	—	—	—	—
25. Barsi-Nagar Oomras	—	2	47	6	55
26. Hyderabad Oomras	—	1	22	7	30
Total	1	38	493	102	634
27. HYDERABAD GAORANI	—	—	—	1	1

* Standard Indian bales of approximate average gross weight 400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

† Includes U. S. A.

APPENDIX IV—(*Contd.*)

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES.

(Compiled from voluntary returns furnished by exporters.)

1st September 1940 to 31st August 1941.

(In thousand bales of 400 lbs. each.)*

Trade Descriptions of Cotton.	Exported to				Total Exports.
	Europe (except United Kingdom) and the West.†	United Kingdom.	Japan.	China and the East (except Japan).	
CENTRAL INDIA—					
28. Malvi	—	—	1	—	1
29. Central India—Others	—	—	20	5	25
Total	—	—	21	5	26
30. BROACH	—	5	26	76	107
31. SURTI	—	4	5	15	24
DHOLLERAS—					
32. Gujerat—Dholleras	—	—	3	—	3
33. Gujerat—Short staple	—	—	1	—	1
34. Kathiawar—Dholleras	—	—	3	2	5
35. Kathiawar—Short staple	—	—	5	—	5
36. Cutch—Dholleras	—	—	1	—	1
Total	—	—	13	2	15
SOUTHERNS—					
37. Kumptas (Jayawant)	—	—	1	4	5
38. Kumptas (Unspecified)	—	—	—	4	4
39. Bijapur and Bagalkot Jowari	—	—	2	4	6
40. Madras Westerns—Hagari-1	—	—	1	18	19
41. Madras Westerns—Ordinary	—	—	2	7	9
42. Hyderabad Westerns	—	—	—	3	3
43. White and Red Northerns	—	—	—	—	—
44. Warangal and Cocanadas	—	11	—	—	11
45. Chinnapathi (Short staple)	—	—	—	1	1
Total	—	11	6	41	58
TINNEVELLIES (including Karungannies)—					
46. Tinnevellies	—	1	4	3	8
47. Karungannies	—	—	5	5	10
Total	—	1	9	8	18
48. SALEMS	—	—	—	—	—
49. COMILLAS	26	3	—	1	30
50. UNCLASSIFIED	—	—	29	20	49
TOTAL INDIAN COTTON	155	365	908	575	2,003

* Standard Indian bales of approximate average gross weight 400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

† Includes U. S. A.

APPENDIX

STOCKS OF INDIAN RAW COTTON HELD IN INDIA BY THE

(In thousand bales*

Trade Descriptions of Cotton.	Trade Stocks on 31st August.					
	Bombay Island.		Karachi.		Rest of India.	
	1940.	1941.	1940.	1941.	1940.	1941.
Bengals—						
U. P. Deshi	—	—	1	—	(a) 6	(a) 3
Punjab Deshi	—	—	74	73	(b) 3	(b) 12
Sind Deshi	—	—	20	36	—	—
Rajputana Deshi	—	—	—	—	—	—
Unclassified	22	41	2	—	—	—
Total	22	41	97	109	9	15
Americans—						
Sind Sudhar (289-F-1)						
Sind-289-F-types (other than 289-F-1)	8	9	1	5	—	—
Sind—98						
Sind—4-F (Ordinary)	4	1	18	—	—	—
Punjab—289-F/K.25			9	3	(b) 1	(b) 12
Punjab—289-F/43	4	11			(b) 1	—
Punjab—L. S. S.			3	3	—	(b) 1
Punjab—(Unspecified-4-F)	8	7	91	50	(b) 5	(b) 19
Buri	—	—	—	—	—	—
Dharwar (Gadag 1)	—	—	—	—	(c) 5	(c) 5
Dharwar (Upland-Unspecified)	—	—	—	—	(d) 11	—
Cambodia (Co. 3 & Co. 4)	—	—	—	—	—	—
Cambodia (Co. 2)	—	—	—	—	—	—
Cambodia (Unspecified)	—	3	—	—	(e) 40	(e) 70
Total	24	31	122	61	63	107
Oomras—						
C. P. and Nimar Oomras	41	54	—	—	(f) 25	(f) 34
Berar Oomras	66	92	—	—	(g) 38	(g) 41
C. P. and Berar Verum	—	—	—	—	—	—
Khandesh Oomras	25	87	—	—	(h) 6	(h) 12
Jarila (Khandesh)	—	—	—	—	—	—
Khandesh Banilla	—	—	—	—	—	—
Barsi-Nagar Oomras	35	72	—	—	—	—
Hyderabad Oomras					(i) 31	(i) 43
Total	167	305	—	—	100	130
Hyderabad Gaorani	1	1	—	—	(i) 4	(i) 4

* Standard Indian bales of approximate average gross weight

N.B.—The detailed statement of mill

(*a*) At Cawnpore.
(*b*) In the Punjab.
(*c*) At Gadag.
(*d*) At Hubli and Gadag.
(*e*) In Madras Province.
(*f*) In Central Provinces and Berar.

V.

MILLS AND THE TRADE ON 31st AUGUST 1940 AND 1941.

of 400 lbs. each.)

Total India.		Mill Stocks on 31st August. Total India.		Total Trade and Mill Stocks on 31st August.		Trade Descriptions of Cotton.
1940.	1941.	1940.	1941.	1940.	1941.	
						BENGALS—
7	3	41	61	48	64	U. P. Deshi.
77	85	27	67	104	152	Punjab Deshi.
20	36	1	2	21	38	Sind Deshi.
—	—	9	15	9	15	Rajputana Deshi.
24	41	—	—	24	41	Unclassified.
128	165	78	145	206	310	Total.
						AMERICANS—
			18			Sind Sudhar (289-F-1).
9	14	19	27	28	68	Sind—289-F types (other than 289-F-1).
			9			Sind—98.
22	1	24	27	46	28	Sind—4-F (Ordinary).
			25			Punjab—289-F/K. 25.
18	30	56	21	96	99	Punjab—289-F/43.
		22	23			Punjab—L. S. S.
104	76	113	138	217	214	Punjab—(Unspecified-4-F).
—	—	1	7	1	7	Buri.
5	5	3	9	8	14	Dharwar (Gadag 1).
11	—	3	5	14	5	Dharwar (Upland-Unspecified).
—	—	—	3	—	3	Cambodia (Co. 3 & Co. 4).
—	—	40	68	40	68	Cambodia (Co. 2).
40	73	18	41	58	114	Cambodia (Unspecified).
209	199	299	421	508	620	Total.
						OOMRAS—
66	88	41	77	107	165	C. P. and Nimar Oomras.
104	133	22	54	126	187	Berar Oomras.
—	—	27	25	27	25	C. P. and Berar Verum.
31	99	11	14	42	113	Khandesh Oomras.
—	—	—	19	—	19	Jarila (Khandesh).
—	—	8	18	8	18	Khandesh Banilla.
66	115	12	18	100	178	Barsi-Nagar Oomras.
		22	45			Hyderabad Oomras.
267	435	143	270	410	705	Total.
5	5	43	60	48	65	HYDERABAD GAORANI.

400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

stocks on 31st August 1941 is attached.

(*g*) In Berar.

(*h*) In East and West Khandesh Districts.

(*i*) In Hyderabad State.

APPENDIX

STOCKS OF INDIAN RAW COTTON HELD IN INDIA BY THE

(In thousand bales*

Trade Descriptions of Cotton.	Trade Stocks on 31st August.					
	Bombay Island.		Karachi.		Rest of India.	
	1940.	1941.	1940.	1941.	1940.	1941.
CENTRAL INDIA—						
Malvi	—	—	—	—	—	—
Central India—Others	21	45	—	—	(j) 38	(j) 25
Total ..	21	45	—	—	38	25
BROACH	119	72	—	—	(k) 17	(l) 27
SURTI	39	14	—	—	—	—
DHOLLERAS—						
Gujerat—Dholleras ..	17	25	—	—	(l) 6	(l) 20
Gujerat—Short staple ..						
Kathiawar—Dholleras						
Kathiawar—Short staple ..	5	11	—	—	—	—
Cutch—Dholleras	—	—	—	—	—	—
Total ..	22	36	—	—	6	20
SOUTHERNS—						
Kumptas (Jayawant)	—	—	—	—	(d) 10	(d) 5
Kumptas (Unspecified) ..	6	32	—	—	(m) 5	(i) 4
Bijapur and Bagalkot Jowari.						
Madras Westerns (Hagari-1) ..						
Madras Westerns (Ordinary) ..	9	26	—	—	(n) 67	(n) 27
Hyderabad Westerns						
White and Red Northerns ..						
Warangal and Cocanadas ..	—	—	—	—	(o) 21	(o) 28
Chinnapathi (Short staple) ..	—	—	—	—	—	—
Total ..	15	58	—	—	103	64
TINNEVELLIES (including Karungannies)						
Tinnevellies	—	2	—	—	(e) 26	(e) 33
Karungannies					—	—
Total ..	—	2	—	—	26	33
SALEMS	—	—	—	—	(e) 10	(e) 15
COMILLAS	—	—	—	—	—	—
UNCLASSIFIED	6	—	—	—	(k) 8	(k) 4
TOTAL INDIAN COTTON ..	436	605	219	170	384	444

* Standard Indian bales of approximate average gross weight.

(d) At Hubli and Gadag.
(e) In Madras Province.
(i) In Hyderabad State.
(j) In Indore and Gwalior States.
(k) In Baroda State.
(l) In Baroda State and at Ahmedabad.
(m) At Gadag and Bailhongal.

N.B:—The detailed statement of mill stocks

V—(*contd.*)

MILLS AND THE TRADE ON 31st AUGUST 1940 AND 1941.

of 400 lbs. each.)

Total India.		Mill Stocks on 31st August. Total India.		Total Trade and Mill Stocks on 31st August.		Trade Descriptions of Cotton.
1940.	1941.	1940.	1941.	1940.	1941.	
						CENTRAL INDIA—
—	—	17	53	17	53	Malvi.
59	70	16	47	75	117	Central India—Others.
59	70	33	100	92	170	Total.
136	99	63	65	199	164	BROACH.
39	14	49	50	88	64	SURTI.
						DHOLLERAS—
		16	23			Gujerat—Dholleras.
23	45	6	13	54	96	Gujerat—Short staple.
		9	15			Kathiawar—Dholleras.
5	11	2	9	7	20	Kathiawar—Short staple.
—	—	—	—	—	—	Cutch—Dholleras.
28	56	33	60	61	116	Total.
						SOUTHERNS—
10	5	33	45	43	50	Kumptas (Jayawant).
11	36	41	48	52	84	Kumptas (Unspecified).
		9	39			Bijapur and Bagalkot Jowari.
			28			Madras Westerns (Hagari-1).
76	53	39	41	136	188	Madras Westerns (Ordinary).
			12			Hyderabad Westerns.
		12	15			White and Red Northerns.
21	28	6	8	27	36	Warangal and Cocanadas.
—	—	—	—	—	—	Chinnapathi (Short staple).
118	122	140	236	258	358	Total.
						TINNEVELLIES (including Karungannies).
26	35	25	29	51	97	Tinnevellies.
—		27	33	27		Karungannies.
26	35	52	62	78	97	Total.
10	15	1	6	11	21	SALEMS.
—	—	—	—	—	—	COMILLAS.
14	4	—	—	14	4	UNCLASSIFIED.
1,039	1,219	934	1,475	1,973	2,694	TOTAL INDIAN COTTON.

400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

on 31st August 1941 is attached.

(*n*) In Hyderabad State, Madras Province and at Bijapur.

(*o*) In Hyderabad State and Madras Province.

STOCKS OF RAW COTTON HELD BY THE

(Compiled from voluntary

(In thousand bales*

Trade Descriptions of Cotton.	Bombay Island.	Ahmedabad.	Rest of Bombay Province.	Total Bombay Province.	Madras North.	Madras South.	Total Madras Province.	United Provinces.	Central Provinces.	Berar.	Total C. P. & Berar.	Bengal.
BENGALS—												
U. P. Deshi	1	4	—	5	—	—	—	40	—	—	—	4
Punjab Deshi	7	—	1	8	—	—	—	11	—	—	—	3
Sind Deshi	1	—	1	2	—	—	—	—	—	—	—	—
Rajputana Deshi	2	—	—	2	—	—	—	1	—	—	—	—
Total ..	11	4	2	17	—	—	—	52	—	—	—	7
AMERICANS—												
Sind Sudhar (289-F-1) ..	12	4	—	16	—	2	2	—	—	—	—	—
Sind—289-F types (other than 289-F-1)	18	3	1	22	1	4	5	—	—	—	—	—
Sind—98	4	—	—	4	—	4	4	—	—	—	—	—
Sind—4-F (Ordinary) ..	13	—	—	13	—	10	10	—	—	—	—	—
Punjab—289-F/K. 25	9	1	—	10	—	3	3	3	—	—	—	3
Punjab—289-F/43	9	1	—	10	—	—	—	9	—	—	—	1
Punjab—L. S. S.	3	—	—	3	—	—	—	7	1	—	1	6
Punjab—(Unspecified-4-F) ..	15	1	—	16	—	5	5	78	—	—	—	6
Buri	—	—	—	—	—	—	—	—	6	—	6	1
Dharwar (Gadag 1)	5	—	3	8	—	—	—	—	—	—	—	—
Dharwar (Upland-Unspecified).	2	—	1	3	—	1	1	—	—	—	—	—
Cambodia (Co. 3 & Co. 4)	—	—	—	—	—	3	3	—	—	—	—	—
Cambodia (Co. 2)	1	—	1	2	—	64	64	—	—	—	—	—
Cambodia (Unspecified) ..	3	1	—	4	1	30	31	—	—	—	—	3
Total ..	94	11	6	111	2	126	128	97	7	—	7	20
OOMRAS—												
C. P. and Nimar Oomras ..	15	—	2	17	—	7	7	2	39	3	42	1
Berar Oomras	11	3	3	17	—	1	1	—	20	11	31	2
C. P. and Berar Verum ..	11	1	1	13	—	1	1	1	3	3	6	2
Khandesh Oomras	9	1	2	12	—	1	1	—	—	—	—	—
Jarila (Khandesh)	7	5	3	15	—	1	1	—	1	—	1	1
Khandesh Banilla	—	1	16	17	—	1	1	—	—	—	—	—
Barsi-Nagar Oomras	1	—	16	17	—	—	—	—	—	—	—	—
Hyderabad Oomras	2	1	17	20	1	—	1	1	1	—	1	—
Total ..	56	12	60	128	1	12	13	4	64	17	81	6
HYDERABAD GAORANI	6	—	13	19	8	—	8	—	15	—	15	—
CENTRAL INDIA—												
Malvi	5	2	—	7	—	—	—	6	—	—	—	—
Central India—Others	6	2	2	10	—	3	3	10	—	—	—	1
Total ..	11	4	2	17	—	3	3	16	—	—	—	1

* Standard Indian bales of approximate average gross weight

MILLS IN INDIA ON 31st AUGUST 1941.

returns furnished by mills.)

of 400 lbs. each.)

Punjab & Delhi.	Rest of British India.	Total British India.	Hyderabad.	Mysore.	Baroda.	Gwalior.	Indore.	Kathiawar States.	Other Indian States.	Pondicherry.	Total Indian States.	GRAND TOTAL.	Trade Descriptions of Cotton
													BENGALS—
3	1	53	—	1	—	6	—	—	1	—	8	61	U. P. Deshi.
35	7	64	—	—	—	—	—	—	3	—	3	67	Punjab Deshi.
—	—	2	—	—	—	—	—	—	—	—	—	2	Sind Deshi.
—	8	11	—	—	—	1	1	—	2	—	4	15	Rajputana Deshi.
38	16	130	—	1	—	7	1	—	6	—	15	145	Total.
													AMERICANS—
—	—	18	—	—	—	—	—	—	—	—	—	18	Sind Sudhar (289-F-1).
—	—	27	—	—	—	—	—	—	—	—	—	27	Sind—289-F types (other than 289-F-1).
—	—	8	—	—	—	—	—	—	1	—	1	9	Sind—98.
—	—	23	—	—	—	—	—	—	1	3	4	27	Sind—4-F (Ordinary).
3	—	22	—	1	1	1	—	—	—	—	3	25	Punjab—289-F/K.25.
1	—	21	—	—	—	—	—	—	—	—	—	21	Punjab—289-F/43.
2	1	20	—	—	—	2	—	—	1	—	3	23	Punjab—L. S. S.
23	3	131	—	—	—	5	—	—	2	—	7	138	Punjab—(Unspecified-4-F).
—	—	7	—	—	—	—	—	—	—	—	—	7	Buri.
—	—	8	—	1	—	—	—	—	—	—	1	9	Dharwar (Gadag 1).
—	—	4	—	—	—	—	—	—	—	1	1	5	Dharwar (Upland-Unspecified).
—	—	3	—	—	—	—	—	—	—	—	—	3	Cambodia (Co. 3 & Co. 4).
—	—	66	—	1	—	—	—	—	1	—	2	68	Cambodia (Co. 2).
—	1	39	—	1	—	1	—	—	—	—	2	41	Cambodia (Unspecified).
29	5	397	—	4	1	9	—	—	6	4	24	421	Total.
													OOMRAS—
—	—	69	—	1	—	—	2	—	4	1	8	77	C. P. and Nimar Oomras.
—	—	51	—	—	1	—	1	—	1	—	3	54	Berar Oomras.
—	—	23	—	—	—	—	1	—	1	—	2	25	C. P. and Berar Verum.
—	—	13	—	—	1	—	—	—	—	—	1	14	Khandesh Oomras.
—	—	18	—	—	—	1	—	—	—	—	1	19	Jarila (Khandesh).
—	—	18	—	—	—	—	—	—	—	—	—	18	Khandesh Banilla.
—	—	17	—	—	—	—	—	1	—	—	1	18	Barsi-Nagar Oomras.
—	—	23	21	—	—	—	—	—	1	—	22	45	Hyderabad Oomras.
—	—	232	21	1	2	1	4	1	7	1	38	270	Total.
—	—	42	16	1	—	—	—	—	—	1	18	60	HYDERABAD GAORANI.
													CENTRAL INDIA—
—	1	14	—	—	5	12	18	—	4	—	39	53	Malvi.
—	—	24	—	—	—	1	20	—	2	—	23	47	Central India—Others.
—	1	38	—	—	5	13	38	—	6	—	62	100	Total.

400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

STOCKS OF RAW COTTON HELD BY THE

(Compiled from voluntary

(In thousand bales*

Trade Descriptions of Cotton.	Bombay Island.	Ahmedabad.	Rest of Bombay Province.	Total Bombay Province.	Madras North.	Madras South.	Total Madras Province.	United Provinces.	Central Provinces.	Berar.	Total C. P. & Berar.	Bengal.
BROACH	33	20	1	54	—	3	3	—	—	—	—	—
SURTI	30	11	1	42	—	—	—	—	1	—	1	—
DHOLLERAS—												
Gujerat—Dholleras	1	16	—	17	—	—	—	—	—	—	—	—
Gujerat—Short staple	3	9	1	13	—	—	—	—	—	—	—	—
Kathiawar—Dholleras ..	1	6	—	7	—	—	—	—	—	—	—	—
Kathiawar—Short staple ..	3	2	—	5	—	—	—	—	—	—	—	—
Cutch—Dholleras	—	—	—	—	—	—	—	—	—	—	—	—
Total ..	8	33	1	42	—	—	—	—	—	—	—	—
SOUTHERNS—												
Kumptas (Jayawant)	34	2	4	40	3	—	3	—	—	—	—	—
Kumptas (Unspecified) ..	18	—	7	25	1	—	1	—	—	—	—	—
Bijapur and Bagalkot Jowari.	7	—	27	34	—	1	1	—	—	—	—	—
Madras Westerns (Hagari-1) ..	1	1	1	3	13	3	16	—	—	—	—	1
Madras Westerns (Ordinary) ..	8	3	2	13	4	8	12	1	—	—	—	5
Hyderabad Westerns	—	1	5	6	—	1	1	—	—	—	—	—
White and Red Northerns ..	—	1	1	2	10	1	11	—	—	—	—	—
Warangal and Cocanadas ..	—	—	—	—	2	1	3	—	—	—	—	1
Chinnapathi (Short staple) ..	—	—	—	—	—	—	—	—	—	—	—	—
Total ..	68	8	47	123	33	15	48	1	—	—	—	7
TINNEVELLIES (including Karungannies)—												
Tinnevellies	2	—	—	2	—	27	27	—	—	—	—	—
Karungannies	—	—	—	—	—	31	31	—	—	—	—	1
Total ..	2	—	—	2	—	58	58	—	—	—	—	1
SALEMS	1	—	—	1	—	5	5	—	—	—	—	—
COMILLAS	—	—	—	—	—	—	—	—	—	—	—	—
Total Indian Cotton ..	320	103	133	556	44	222	266	170	87	17	104	42
AMERICANS	10	—	1	11	—	1	1	—	—	—	—	1
EGYPTIANS	9	38	4	51	1	8	9	—	1	—	1	2
EAST AFRICANS	30	29	7	66	—	2	2	—	2	—	2	3
OTHERS (Sudan, Burma, etc.) ..	47	9	3	59	1	8	9	—	4	—	4	—
Total Foreign Cotton ..	96	76	15	187	2	19	21	—	7	—	7	6
GRAND TOTAL ..	416	179	148	743	46	241	287	170	94	17	111	48

*Standard Indian bales of approximate average gross weight

MILLS IN INDIA ON 31st AUGUST 1941.

returns furnished by mills.)

of 400 lbs. each.)

Punjab & Delhi.	Rest of British India.	Total British India.	Hyderabad.	Mysore.	Baroda.	Gwalior.	Indore.	Kathiawar States.	Other Indian States.	Pondicherry.	Total Indian States.	GRAND TOTAL.	Trade Descriptions of Cott
—	—	57	—	—	7	—	—	1	—	—	8	65	BROACH.
—	—	43	—	—	2	—	1	4	—	—	7	50	SURTI.
													DHOLLERAS—
—	1	18	—	—	2	—	—	3	—	—	5	23	Gujerat—Dholleras.
—	—	13	—	—	—	—	—	—	—	—	—	13	Gujerat—Short staple.
—	—	7	—	—	4	—	—	4	—	—	8	15	Kathiawar—Dholleras.
—	—	5	—	—	—	—	—	4	—	—	4	9	Kathiawar—Short staple.
—	—	—	—	—	—	—	—	—	—	—	—	—	Cutch—Dholleras.
—	1	43	—	—	6	—	—	11	—	—	17	60	Total.
													SOUTHERNS—
—	—	43	—	1	—	—	1	—	—	—	2	45	Kumptas (Jayawant).
—	—	26	2	15	2	—	—	—	3	—	22	48	Kumptas (Unspecified).
—	—	35	—	3	—	—	—	—	—	1	4	39	Bijapur and Bagalkot Jowari.
—	—	20	—	6	1	—	—	—	1	—	8	28	Madras Westerns (Hagari-1).
—	—	31	—	9	1	—	—	—	—	—	10	41	Madras Westerns (Ordinary).
—	—	7	3	2	—	—	—	—	—	—	5	12	Hyderabad Westerns.
—	—	13	—	2	—	—	—	—	—	—	2	15	White and Red Northerns.
—	—	4	4	—	—	—	—	—	—	—	4	8	Warangal and Cocanadas.
—	—	—	—	—	—	—	—	—	—	—	—	—	Chinnapathi (Short staple).
—	—	179	9	38	4	—	1	—	4	1	57	236	Total.
													TINNEVELLIES (including Karungannies)—
—	—	29	—	—	—	—	—	—	—	—	—	29	Tinnevellies.
—	—	32	—	—	—	—	—	—	1	—	1	33	Karungannies.
—	—	61	—	—	—	—	—	—	1	—	1	62	Total.
—	—	6	—	—	—	—	—	—	—	—	—	6	SALEMS.
—	—	—	—	—	—	—	—	—	—	—	—	—	COMILLAS.
67	23	1,228	46	45	27	30	45	17	30	7	247	1,475	Total Indian Cotton.
—	—	13	—	—	—	—	—	—	—	—	—	13	AMERICANS.
1	—	64	—	2	2	—	1	—	1	—	6	70	EGYPTIANS.
1	—	74	—	1	6	—	—	1	—	—	8	82	EAST AFRICANS.
—	—	72	—	—	1	—	—	—	—	—	1	73	OTHERS (Sudan, Burma, *etc.*).
2	—	223	—	3	9	—	1	1	1	—	15	238	Total Foreign Cotton.
69	23	1,451	46	48	36	30	46	18	31	7	262	1,713	GRAND TOTAL.

400 lbs. and net weight 392 lbs. of cleaned (lint) cotton.

STOCKS OF INDIAN COTTON ON 31st JANUARY 1941 HELD BY THE MILLS AND THE TRADE IN MADRAS PROVINCE.

(In thousand bales of 400 lbs. each.)

Trade Descriptions of Cotton.	Mill stocks on 31st January.					Trade stocks on 31st January.					Total stocks on 31st January.				
	1937.	1938.	1939.	1940.	1941.	1937.	1938.	1939.	1940.	1941.	1937.	1938.	1939.	1940.	1941.
Tinnevellies	28	22	32	20	18	4	18	4	2	14	32	40	36	22	32
Salems	8	15	16	4	9	2	3	8	3	2	10	18	24	7	11
Cambodias	47	46	71	33	34	11	14	17	5	21	58	60	88	38	55
Northerns & Westerns	22	24	19	15	23	11	12	18	2	16	33	36	37	17	39
Cocanadas	*	*	1	1	1	10	12	14	8	9	10	12	15	9	10
Outside Cottons ..	34	50	27	49	56	..	..	..	..	..	34	50	27	49	56
Total	139	157	166	122	141	38	59	61	20	62	177	216	227	142	203

* Less than 500 bales.

APPENDIX VI.

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS.

(Based on returns made under the Indian Cotton Cess Act, 1923, by mills in British India, and on voluntary returns from mills in Indian States).

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

	1926-27.	1927-28.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	†1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
Bombay Island ..	747,988	435,426	542,036	766,375	664,546	611,606	565,084	491,709	687,287	664,199	636,720	782,815	750,317	634,149	982,084
Ahmedabad	264,139	298,075	318,983	344,021	321,503	322,257	348,009	373,345	326,558	320,982	304,398	346,269	346,375	305,459	341,800
Bombay Province ..	1,167,892	894,671	1,044,925	1,300,859	1,173,659	1,132,645	1,116,297	1,063,549	1,230,616	1,189,310	1,128,744	1,353,998	1,316,313	1,172,285	1,580,079
Madras Province ..	185,207	194,591	204,284	211,488	214,759	260,707	292,013	278,060	312,164	365,423	412,268	422,573	480,839	507,391	525,611
United Provinces ..	204,702	170,846	182,462	234,205	235,623	256,820	273,573	277,230	292,424	317,611	299,073	288,320	356,331	349,340	381,025
Central Provinces and Berar	111,292	116,888	121,391	123,146	118,492	115,018	111,208	112,660	125,014	130,298	122,987	146,587	164,616	142,868	153,825
Bengal	89,763	82,086	84,212	99,075	91,993	102,390	103,784	107,633	101,101	98,892	79,944	92,546	90,611	111,383	135,227
The Punjab and Delhi.	40,687	45,638	54,575	64,464	73,736	89,681	80,854	71,939	83,897	89,430	93,886	94,742	133,347	165,274	171,652
Rest of British India	13,190	15,040	22,189	24.458	27,101	30,342	31,935	35,139	38,575	38,010	35,823	46,840	49,806	44,867	47,316
Total—British India..	1,812,733	1,519,760	1,714,038	2,05[illegible],695	1,935,363	1,987,603	2,009,664	1,946,210	2,183,791	2,228,374	2,172,725	2,445,606	2,591,863	2,493,408	2,994,735
Total—Indian States*	229,443	251,589	277,540	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412
TOTAL—INDIA ..	2,042,176	1,771,349	1,991,578	2,373,094	2,269,359	2,346,396	2,360,924	2,336,326	2,612,132	2,677,688	2,632,785	2,999,609	3,151,065	3,050,106	3,617,147

* Figures for Indian States up to and including 1930-31, being based on yarn production returns, include foreign cotton also.

† From April 1937 figures for Burma have been excluded.

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES.

(Based on voluntary returns from mills in Indian States).

N.B.—Figures up to and including 1930-31, being based on yarn production, include foreign cotton also.

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1926-27	1927-28.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
Hyderabad	15,210	16,697	19,067	20,823	23,074	31,299	33,488	33,231	45,588	51,771	49,081	63,093	68,156	67,995	72,860
Mysore	43,571	44,320	39,619	46,590	43,326	49,293	50,596	47,168	51,196	50,824	53,236	55,244	53,858	67,851	65,062
Baroda	46,070	46,884	48,852	59,043	62,578	58,534	50,587	53,612	57,146	51,963	51,761	70,686	73,278	65,573	91,519
Gwalior	24,257	25,716	36,708	41,463	45,207	45,892	43,306	49,362	56,318	72,163	79,079	89,243	94,090	88,688	95,517
Indore	53,526	65,391	76,070	83,026	88,620	95,296	91,036	111,430	114,229	113,379	106,454	147,766	140,792	120,186	138,795
Kathiawar States ..	} 46,809	52,581	57,224	64,454	{ 20,283	18,849	18,868	26,506	35,438	37,397	42,717	48,545	44,109	43,703	50,479
Other Indian States ..					{ 32,558	39,382	40,209	45,197	45,735	51,462	57,767	57,119	58,444	} 102,702	108,180
Pondicherry					{ 18,350	20,257	23,170	23,610	22,691	20,355	19,065	22,307	26,475		
Total—Indian States	229,443	251,589	277,540	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412

LOOSE (UNPRESSED) INDIAN RAW COTTON RECEIVED IN SPINNING MILLS IN BRITISH INDIA.

(Based on voluntary returns furnished by mills.)

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1926-27.	1927-28.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	‡1936-37.	1937-38.	1938-39.	1939-40.	1940-41.
Bombay Province ..	28,328	24,970	27,324	24,361	54,409	74,979	80,092	74,868	58,355	75,617	67,219	74,750	80,164	86,687	96,215
Madras Province ..	35,198	39,560	52,188	46,582	55,717	99,389	96,340	110,875	123,260	147,044	173,102	156,675	162,489	175,540	189,257
United Provinces ..	16,991	10,308	13,878	20,441	18,496	14,367	19,236	17,871	10,090	10,405	10,659	15,719	17,532	20,279	29,127
Central Provinces and Berar	40,762	20,861	6,924	16,243	15,771	20,743	17,462	18,382	20,544	27,502	26,321	32,860	26,980	29,052	32,589
Bengal*	..	..	..	..	..	..	..	..	..	..	90	..	3	..	..
The Punjab and Delhi†	3,910	4,739	3,760	4,361	4,307	2,317	2,149	..	5,535	3,110	28,385	23,873	25,960	33,079	28,627
Rest of British India*	..	..	..	..	..	..	..	..	..	..	19,282	17,160	22,916	12,734	15,529
Total—British India	125,189	100,438	104,074	111,988	148,700	211,795	215,279	221,996	217,784	263,678	325,058	321,037	336,041	357,374	391,344
Indian States* ..	..	..	..	..	..	..	..	..	..	..	131,149	109,003	122,078	116,962	131,657
Total—INDIA* ..	..	..	..	..	..	..	..	..	..	..	456,207	430,040	458,119	474,336	523,001

* Figures up to 1935-36 not complied.

† Figures up to 1935-36 exclude Delhi.

‡ From 1936-37 the figures refer to consumption and not receipts and are based on returns furnished under the Indian Cotton Cess Act, 1923, by mills in British India and on voluntary returns from mills in Indian States. From April 1937 figures for Burma have been excluded.

APPENDIX VII.

Revised Trade Classification of Indian Cottons.

Trade Descriptions.	Tracts included.
I. BENGALS.—	
(1) U. P. Deshi	United Provinces (including Rampur State), Delhi, Bihar, Orissa [excluding the districts of (i) Koraput and (*ii*) Ganjam (other than the Khondmals)], Bundelkhand Agency of Central India, Rewa State of Central India Residency (Indore), and Western Bengal (Bankura and Midnapore districts).
(2) Punjab Deshi	Punjab (including Indian States, except Khairpur State) and North-West Frontier Province.
(3) Sind Deshi	Sind (including Khairpur State).
(4) Rajputana Deshi.	Ajmer Merwara, and Rajputana States (excluding Jhalawar and Partabgarh States and Sironj, Chhabra and Pirawa parganas of Tonk State).
II. AMERICANS.—	
(1) Sind-American	Sind (including Khairpur State).
(2) Punjab-American.	Punjab (including Indian States, except Khairpur State).
(3) Buri	Burhanpur *tahsil* of Nimar district of Central Provinces.
III. OOMRAS.—	
(1) C.P. Oomras	Central Provinces (excluding Nimar district); and Yeotmal district of Berar.
(2) Berar Oomras	Berar (excluding Yeotmal district).
(3) Nimar Oomras	Nimar district of Central Provinces.
(4) C.P. and Berar Verum.	Central Provinces and Berar.
(5) Khandesh Oomras.	Nasik, East Khandesh (excluding Amalner taluka) and West Khandesh (excluding Nawapur and Shirpur talukas) districts of Bombay Province.
(6) Khandesh Banilla.	Amalner taluka of East Khandesh district and Shirpur taluka of West Khandesh district of Bombay Province.
(7) Barsi-Nagar Oomras.	Ahmednagar, Poona and Sholapur districts of Bombay Province and Akalkot State.

Trade Descriptions.		Tracts included.
III.	OOMRAS—(*contd.*).	
	(8) Hyderabad Oomras.	Aurangabad, Bir (excluding Mominabad taluka), Parbhani, Adilabad (excluding Nirmal taluka), Osmanabad (excluding the protected tract included under "Hyderabad-Gaorani") and Nizamabad districts of Hyderabad State.
IV.	HYDERABAD-GAORANI.	The Hyderabad-Gaorani Protected Area of Hyderabad State comprising: the districts of Nander and Bidar, part of Osmanabad district, Nirmal taluka of Adilabad district and Mominabad taluka of Bir district.
V.	CENTRAL INDIA—	
	(1) Malvi (2) Central India —Others.	Gwalior State, Indore State, Bhopal Agency and Malwa Agency of Central India; Jhalawar and Partabgarh States and Sironj, Chhabra and Pirawa parganas of Tonk State of Rajputana.
VI.	BROACH	Kaira district and Broach and Panch Mahals district (excluding Ankleshwar taluka) of Bombay Province, certain States* in the Gujarat States Agency and Baroda district of Baroda State.
VII.	SURTI	Ankleshwar taluka of Broach and Panch Mahals district, Surat district and Nawapur taluka of West Khandesh district of Bombay Province, Rajpipla, Sachin, Bansda and Dharampur States of the Gujarat States Agency and Navsari district of Baroda State.
VIII.	DHOLLERAS.—	
	(1) Gujerat—Dholleras.	"Wagad," "Lalio" and other staple cottons grown in Ahmedabad district of Bombay Province, Mehsana district of Baroda State and in part of Western India States Agency.
	(2) Gujerat—Short-staple.	Short-staple cottons grown in part of Western India States Agency.
	(3) Kathiawar—Dholleras.	"Wagad," "Kala" and other staple cottons grown in part of Western India States Agency.

* Including Balasinor, Baria, Cambay, Chota Udepur, Lunawada, Sant, Jambugoda, Kadana, Mandwa, Vajiria and Bhaderwa.

Trade Descriptions.	Tracts included.
VIII. Dholleras—*(contd).*	
(4) Kathiawar—Short-staple.	"Mathia" and other short-staple cottons grown in part of Western India States Agency and in Amreli district of Baroda State.
(5) Cutch Dholleras.	Cutch State.
IX. Southerns—	
(1) Kumpta and Upland.	Dharwar, Belgaum and Satara districts of Bombay Province; Satara Jagirs; S. M. C. States; Mysore State (excluding Mysore and Bangalore districts); and Raichur Protected Area in Raichur district of Hyderabad State.
(2) Bijapur and Bagalkot Jowari.	Bijapur district of Bombay Province.
(3) Westerns	Bellary, Anantapur and Cuddapah districts and Pattikonda taluka of Kurnool district of Madras Province; Raichur district (excluding the Raichur Protected Area) and Gulbarga district of Hyderabad State.
(4) White and Red Northerns.	Kurnool district (excluding Pattikonda taluka but including Banganapalle State) of Madras Province.
(5) Warangal and Cocanadas.	Nellore, Guntur, Kistna, East Godavari and West Godavari districts and Golgonda taluka of Vizagapatam district of Madras Province; Warangal, Karimnagar, Nalgonda, Mahboobnagar, Atrafibalda and Medak districts of Hyderabad State.
(6) Chinnapathi (Short-staple).	Ganjam (excluding the Khondmals) and Koraput districts of Orissa; and Vizagapatam (excluding Golgonda taluka) district of Madras Province.
X. Tinnevellies—	
(including Karungannies).	Coimbatore, Madura, Ramnad and Tinnevelly districts of Madras Province.
XI. Cambodias ..	North Arcot, South Arcot, Coimbatore, Salem, Trichinopoly (including Pudukkottai State), Madura, Ramnad, Tinnevelly, Chittoor and Chingleput districts of Madras Province.
XII. Salems	South Arcot, Coimbatore, Salem, Trichinopoly, Tanjore, Malabar and South Kanara districts of Madras Province; and Mysore district of Mysore State.
XIII. Comillas	Assam; and Eastern Bengal (Mymensingh and Chittagong Hill Tracts districts and Tripura State).

APPENDIX VIII.

Sind Cotton Ginning & Pressing Factories Rules, 1941, under the Cotton Ginning & Pressing Factories (Bombay Amendment) Act, 1936.

REVENUE DEPARTMENT,
Sind Secretariat,
Karachi, 18th April, 1941.

No. 1936–95–83-I (*a*)/E. In exercise of the powers conferred by Section (2) of Section 1 of the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, IV of 1936, His Excellency the Governor of Sind is pleased to direct that the provisions of the said Act shall apply to the whole of the Province of Sind with effect from the date of this notification.

By order of His Excellency the Governor,
(Sd.) B. R. PATEL,
Deputy Secretary to Government.

NOTIFICATION FOR THE SIND GOVERNMENT GAZETTE

REVENUE DEPARTMENT,
Sind Secretariat,
Karachi, 18th April, 1941.

No. 1936-95-83-I (*a*)/E. In exercise of the powers conferred by section 13 of the Cotton Ginning and Pressing Factories Act, 1925 (XII of 1925), as amended by the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, IV of 1936, His Excellency the Governor of Sind is pleased to substitute the following rules for those published under notification No. Rev: 1308, dated the 2nd March 1938:

1. *Short title and commencement.*—(1) These rules may be called the Cotton Ginning and Pressing Factories Rules, 1941.

(2) They shall come into force from such date as the Provincial Government may, by a notification in the Official Gazette, appoint in this behalf.

2. *Definitions.*—In these rules, unless there is anything repugnant in the subject or context:—

(1) "Act" means the Cotton Ginning and Pressing Factories Act, 1925, as amended by Bombay Act IV of 1936.

(2) "Section" means a section of the Act;

(3) "Factory" means a cotton ginning factory or a cotton pressing factory as defined in the Act;

(4) "Director" means the Director of Agriculture, Sind.

3. *Admixture of cotton.*—(1) The mixture prescribed for the purposes of section 2 (aa) shall be a mixture of deshi with American or Egyptian varieties of cotton as determined by seed weight and not seed counts during the process of ginning, in which the percentage of the deshi cotton exceeds ten.

Explanation.—An average sample shall consist of a mixture of approximately equal quantities of seed taken from the outturn of each gin in the process of ginning at the time of inspection. A sample of the mixture shall weigh not less than 10 lbs. and shall be divided into two equal parts each of which shall be securely packed in the presence of the gazetted officer concerned and of the factory manager. One of the seed packages shall be retained by the factory manager and the other package sent to the Director of Agriculture for necessary action. For the purposes of analysis, deshi seed should be separated from not less than 1 lb. of the mixture.

(2) Notwithstanding anything herein contained, the Provincial Government may, for such period as it may prescribe exempt any local area from the operation of this rule.

4. *Season.*—The season shall be the period between 1st September of one year and 31st August of the next year.

5. *Application for licence.*—(1) An application for a licence under the Act may be made by the owner of the factory to the Collector within the local limits of whose jurisdiction such factory is situate.

(2) The fee prescribed for any such licence shall be Rs. 10/-per season for any cotton ginning factory or cotton pressing factory or both, if located in the same premises.

(3) Every application for a licence shall be supported by a Treasury Receipt showing the payment of the prescribed amount in the Treasury.

(4) Subject to the restrictions imposed by or under the Act, or the Rules, a licence shall be issued on such application in Form A.

6. *Particulars of cotton ginning factories.*—The particulars of a cotton ginning factory prescribed under sub-section (2) of section 3 shall include the name of the factory, its situation and the name of the owner or lessee.

7. *The proportion of seed.*—The proportion of seed in cotton bales prescribed under sub-section (2) of section 3-A, shall not exceed one per centum.

8. *Authority competent to give a certificate of moisture.*—(1) The Director of Agriculture shall be the authority competent to give a certificate as to the normal quantity

of moisture that a given quantity of ginned cotton should have, as also the quantity of moisture it possesses, provided that he shall make allowance for the absorption by natural causes both before and after the cotton leaves the factory.

(2) Such certificates may be based on (*a*) the analysis of the cotton carried out, at the discretion of the Director, at the Agricultural Research Station at Sakrand or at any other station or farm of the Agricultural Department, or (*b*) the report of two persons selected for the occasion, either one each by the Boards of Directors of the Karachi Cotton Association Limited and the Indian Merchants' Association or both from one of the two Associations, at the request of the Director of Agriculture.

9. *Complaint of offences.*—(1) Any person interested may make a complaint that there has been a contravention of the provisions of section 3-A in respect of any cotton, package or bale.

(2) Such complaints other than those made by a gazetted officer of the status prescribed in sub-para (4) of this rule, shall be made in writing to the Director and shall be accompanied by a sealed sample of the cotton or cotton seed complained of;

Provided that no such complaint shall be entertained unless a fee of Rs. 10 for each bale or package of cotton or part thereof or for each package of cotton or part thereof or for each package or sample of cotton seed with a minimum fee of Rs. 100 is paid at the time of making a complaint.

(3) The Director on receipt of such complaint shall cause the cotton, package or bale or the cotton seed in respect of which the complaint has been made to be seized and sealed and shall forward the same for examination and report to the authority prescribed under these rules.

(4) The officer appointed in accordance with section 3-B and 3-C of the Act shall be a gazetted officer not below the rank of a Cotton Superintendent.

10. *Authority competent to examine cotton, etc.*—The authority competent to examine such cotton shall be—

(*a*) The Director of Agriculture, or

(*b*) the Chairman, Sind Cotton Committee, or

(*c*) any two persons selected either one each by the Board of Directors of the Karachi Cotton Association and the Indian Merchants' Association or both by one of the two Associations at the request of the Director of Agriculture or the Chairman, Sind Cotton Committee, from the panel of arbitrators elected under the rules, from time to time being in force of the said Associations.

11. *Sealing of cotton seized.*—The cotton, package or bale or the cotton seed shall be re-sealed in the manner prescribed in these rules after the examination referred to in rule 10.

12. *Manner of sealing.*—All things seized and required to be sealed under this Act shall be sealed with the official seal of the officer sealing the same and if the owner or the person in charge of the factory so desires, also with the seal, if any, which he may provide for this purpose.

13. *Compilation and publication of returns.*—The statements referred to in sub-sections (1) and (3) of Section 5 of the Act shall be furnished to the Director of Agriculture by the owner of every cotton ginning factory and of every cotton pressing factory in forms B and C, respectively, while those referred to in sub-sections (2) and (4) shall be compiled by the Director in forms D and E. The latter statements shall be published monthly and weekly respectively in the Official Gazette and copies thereof furnished to the Director General of Commercial Intelligence and Statistics, Calcutta, and to the Secretary, Indian Central Cotton Committee, Bombay.

By order of His Excellency the Governor,

(Sd.) B. R. PATEL,

Deputy Secretary to Government.

FORM A.

LICENCE.

(*Rule* 5).

(1) Name of Factory .. ..

(2) Description of the place where it is situated.

(3) Name, description and place of residence of the owner of the Factory.

CONDITIONS.

This licence is granted subject to all the provisions of the Cotton Ginning and Pressing Factories Act (XII of 1925), Bombay Amendment Act, IV of 1936, and the rules made thereunder.

FORM B.

GINNING RETURN.

District _____ Number of Ginning Factory _____

(Return under sub-section (1) of Section 5 of the Cotton Ginning and Pressing Factories Act, 1925, as amended by Bombay Act IV of 1936).

Return showing Quantity of cotton ginned for the month ending _____ 19 .

Name of Ginning Factory with correct Postal Address _____

Name of owner or of registered lessee (if any) _____

Quantity (by weight) of cotton ginned during the month.	Quantity (by weight) of cotton ginned since the commencement of the season (*i. e.*, since 1st September 19) to the end of the month.	REMARKS.
Bojas of 392 lbs. each.	Bojas of 392 lbs. each.	

Dated _____ 19 .

Signature of Owner or Person in charge.

FORM C.

PRESSING RETURN.

District_____ Number of Pressing Factory_____

(Return under sub-section (3) of Section 5 of the Cotton Ginning and Pressing Factories Act, 1925, as amended by Bombay Act IV of 1936).

Return showing quantity of cotton pressed for the week ending_____ 19 .

Name of Pressing Factory with correct Postal Address_____

Name of Owner or of registered lessee (if any)_____

Quantity (by bales) of cotton pressed during the week.	Quantity (by bales) of cotton pressed since the commencement of the season (*i. e.*, since 1st September 19) to the end of the week.	REMARKS.

*Dated*_____ 19 .

Signature of Owner or Person in charge.

FORM D.

GINNING RETURN.

Return showing quantity of cotton ginned in the Province of Sind for the month ending _____ 19 .

Sub-section (2) of Section 5 of the Cotton Ginning and Pressing Factories Act, 1925 (XII of 1925) as amended by Bombay Act IV of 1936.

Name of Division or Block.	Quantity (by weight) of cotton ginned (In Bojas of 392 lbs. each).				Districts included in the Block.
	During the month.	During the corresponding month last year.	Since the commencement of the season *i.e.*, since 1st September 19 .	During the corresponding period last year.	
1	2	3	4	5	6
Total					

Karachi, dated _____ 19 .

Director of Agriculture, Sind.

FORM E.

PRESSING RETURN.

Return showing quantity of cotton pressed in the Province of Sind for the week ending _____ 19 .

Sub-section (4) of Section 5 of the Cotton Ginning and Pressing Factories Act, 1925 (XII of 1925) as amended by Bombay Act IV of 1936.

Name of Division or Block.	Number of bales pressed.				Districts included in the Block.
	During the week.	During the corresponding week last year.	Since the commencement of the season (*i.e.*, since 1st September 19 .)	During the corresponding period last year.	
1	2	3	4	5	6
Total					

Dated _____ 19 ,

Director of Agriculture, Sind.

APPENDIX IX.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941.

Administration (Central).

1.	Secretary	Mr. D. N. Mahta, B.A., (Oxon.).
2.	Assistant Secretary	Mr. C. J. Bocarro, M.B.E., M.A.
3.	Superintendent	Mr. Ajodhya Sahai.
4.	Assistant Superintendent	Mr. A. B. Joshi, M.A., B.Com.
5.	Statistical Assistant	Mr. M. S. Natesan, M.A.
6.	Technical Assistant	Mr. K. Dharma Rajulu, M.Sc.
7.	Accountant	Mr. G. D. Kharod.
8.	First Assistant	Mr. V. F. X. Pais.
9.	Head Typist and Stenographer ..	Mr. P. A. A. Durai.

TECHNOLOGICAL LABORATORY, BOMBAY.

10.	Director	Dr. Nazir Ahmad, O.B.E., M.Sc., Ph.D. (Cantab.), F.Inst.P.
11.	Senior Research Assistant (Chemist)	Mr. D. L. Sen, M.Sc. (Tech.) (Manch.), M.Sc. (Bom.), A.I.I.Sc., F.I.C.
12.	Senior Research Assistant (Physicist)	Mr. N. Hari Rao, M.Sc. (Calcutta).
13.	Senior Research Assistant (Physicist)	Mr. Ram Saran Koshal, M.Sc. (Punjab).
14.	Temporary Chemist	Dr. L. Thoria, Dr. Ing.
15.	Spinning Master	Mr. V. V. Gupte, B.Sc., (Tech). (Manch.), B.Sc. (Bom.).
16.	Junior Research Assistant (Microscopist)	Mr. Amar Nath Gulati, M.Sc. (Punjab).
17.	Statistician and Personal Assistant..	Mr. V. Venkataraman, M.A. (Madras).
18.	Junior Research Assistant (Physicist)	Mr. C. Nanjundayya, M.Sc. (Calcutta).
19.	Junior Research Assistant (Physicist)	R. L. N. Iyengar, M.Sc.
20.	Head Tester	Mr. H. B. Joshi, B.Sc.
21.	Senior Tester	Mr. S. S. Sukhthanker, L.T.C. (V.J.T.I.).
22.	Junior Tester	Mr. G. D. Bhide, B.Sc.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

TECHNOLOGICAL LABORATORY, BOMBAY—(*contd.*)

23.	Junior Tester	Mr. K. V. N. Nayar.
24.	Junior Tester	Mr. V. N. Modak, B.Sc.
25.	Junior Tester	Mr. L. V. Sundararaman, B.A.
26.	Junior Tester	Mr. P. S. Sambamurthy.
27.	Junior Tester	Mr. R. G. Panvalkar, B.Sc.
28.	Junior Tester	Mr. G. J. Kharkar, B.Sc. (on military duty).
29.	Junior Tester	Mr. A. J. Farid.
30.	Junior Tester	Mr. P. V. Nachane, B. Sc.
31.	Junior Tester	Mr. C. S. Ramnathan, B.Sc.
32.	Junior Tester	Mr. B. N. Prabhakar, M.Sc.
33.	Junior Tester	Mr. S. B. Mogre, M.Sc.
34.	Junior Tester	Mr. P. D. Vakil (services lent to I.S.D., Bombay).
35.	Statistical Clerk	Mr. R. Krishna Iyer.
36.	Statistical Clerk	Mr. P. K. Wagle.
37.	Electrician	Mr. H. Lobo, L.E.E. (V.J.T.I.).
38.	Spinning Assistant	Mr. N. Iyengar.
39.	Draughtsman	Mr. B. G. Mehta.
40.	Mechanic	Mr. J. B. Kharas.
41.	Junior Tester (Offg.)	Mr. C. A. S. Iyer, B.Sc.
42.	Junior Tester (Offg.)	Mr. M. Bhasker Rao.
43.	Junior Tester (Offg.)	Mr. R. B. Joshi, B.Sc.
44.	Junior Tester (Offg.)	Mr. S. Ramanathan.
45.	Junior Tester (Offg.)	Mr. T. R. Krishnamurthy, B.Sc.
46.	Junior Tester (Offg.)	Mr. N. C. Chiplonkar, B. Sc.

INSTITUTE OF PLANT INDUSTRY, INDORE.

47.	Director	Rao Bahadur V. A. Tamhane, M.Sc., M.Ag. (Bom.), I.A.S. (Retd.).
48.	Personal Assistant	Mr. A. N. Srivastava, M.Sc. (Lucknow).
49.	Agricultural Chemist	Dr. A. Sreenivasan, M.A., D.Sc. (Madras), A.I.C.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

INSTITUTE OF PLANT INDUSTRY, INDORE—(*contd.*)

50.	Extension Officer	Mr. Kuber Singh, B.Ag. (Bombay).
51.	Farm Superintendent and part-time Extension Officer..	Mr. S. C. Talesara, B.Ag. (Bombay).
52.	Plant Breeder	Mr. C. P. Dutt, M.Sc. (Calif.).
53.	Assistant Plant Breeder	Mr. K. M. Simlote, B.Ag. (Nagpur).
54.	Assistant Farm Superintendent and Seed Multiplication Officer ..	Mr. L. N. Desai, B.Sc. (Agri).
55.	Librarian	Mr. B. H. Khan.
56.	Artist	Mr. J. S. Onkar.

COTTON GENETICS RESEARCH SCHEME, INDORE.

57.	Geneticist and Botanist	Mr. K. Ramiah, M.B.E., M.Sc., Dip. Agri. (Cantab.), L.Ag.
58.	Statistician	Dr. V. G. Panse, B.Sc. (Bom.), Ph.D.(Lond.).
59.	Senior Botanical Assistant	Mr. P. D. Gadkari, M.Sc. (Nagpur).
60.	Genetical Assistant	Mr. Bholanath, M.Sc. (Punjab).
61.	2nd Botanical Assistant	Mr. D. Ganesan, B.A., M.Sc. (Madras).

BOMBAY.

(i) Broach Cotton Breeding Scheme.

62.	Cotton Breeder	Mr. P. L. Patel, M.Sc. (Agri.), (Iowa, U.S.A.).
63.	Botanical Assistant	Mr. R. J. Naik, M.Ag. (Bombay).
64.	Botanical Assistant	Mr. D. D. Gopani, B.Sc. (Agri.).

(ii) Jalgaon Cotton Breeding Scheme.

65.	Agricultural Officer	Mr. B. T. Thakar, B.Ag.
66.	Agricultural Officer	Mr. S. N. Deshpande, B.Sc. (Agri.) (Bombay).

(iii) Scheme for Interspecific Hybridisation in Cottons at Surat.

67.	Agricultural Officer	Mr. K. C. Amin, B.Ag.
68.	Cytological Assistant	Mr. N. K. Iyangar, M.A., M.Sc. (London).
69.	Agricultural Officer	Mr. S. M. Patel, B.Ag.

(iv) Poona Cotton Wilt Breeding Scheme.

70.	Pathological Assistant	Mr. J. D. Ranadive, B.Ag. (Bombay).
71.	Pathological Assistant	Mr. Y. S. Kulkarni, B.Ag. (Bombay).

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

(*v*) *Scheme for Breeding of Wilt Resistant Cottons in Surat Area.*

72. Agricultural Overseer .. .. Mr. S. P. Shah, B.Ag. (Bombay).

(*vi*) *Scheme for Improvement of Wagad Cotton at Viramgam.*

73. Agricultural Overseer .. .. Mr. S. T. Patel, M.Ag. (Bombay).

(*vii*) *Surat Seed Distribution Scheme.*

74. Cotton Assistant .. .. .. Mr. V. V. Patel, B.Ag. (Bombay).

(*viii*) *Khandesh (Jarila) Seed Distribution Scheme.*

75. Agricultural Officer I/C, Bhadgaon Farm .. .. Mr. D. B. Barve, B.Ag.

76. Cotton Superintendent, Jalgaon .. Mr. N. V. Bhagwat, B.Ag.

77. Agricultural Officer .. .. .. Mr. C. A. Borudey, B.Ag.

78. Agricultural Officer .. .. .. Mr. S. Y. Savant, B.Ag.

79. Agricultural Officer .. .. .. Mr. B. P. Joshi, B.Sc. (Agri.).

80. Agricultural Officer .. .. .. Mr. M. V. Pandit, B.Sc. (Agri.).

(*ix*) *B.D. 8 Seed Distribution Scheme.*

81. Cotton Supervisor, Broach .. .. Mr. L. N. Patel, B.Ag. (Bombay).

82. Agricultural Officer, Amod .. .. Mr. D. A. Dave, B.Ag. (Bombay).

(*x*) *Revised Jayawant and Gadag No. 1 Seed Distribution Scheme.*

83. Agricultural Officer, Dharwar .. Mr. S. M. Tippashetti, B.Ag.

84. Agricultural Officer, Bailhongal .. Mr. A. B. Hungund, B.Sc. (Agri.).

85. Agricultural Officer, Bagalkot .. Mr. B. S. Tadsur, B.Ag.

86. Agricultural Officer, Athani .. Mr. N. R. Kulkarni, B.Sc. (Agri.).

87. Agricultural Officer, Havari .. Mr. G. P. Argikar, B.Sc. (Agri.).

88. Technological Assistant (Dharwar) .. Mr. H. R. Nayak, Inter Science (Madras).

89. Technological Assistant (Surat) .. Mr. M. U. Parmar, M.Sc. (Bombay).

SIND.

(*i*) *Scheme for Cotton Jassid Investigation in Sind.*

90. Research Assistant .. .. .. Dr. Nazir Ahmed, M.Sc. (Calcutta), Ph.D. (London), D.I.C. (London).

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

(*ii*) *Sind Seed Distribution Scheme.*

91.	Cotton Superintendent, Left Bank, Hyderabad	.. Mr. W. P. Shahani, B.Ag. (Bombay).
92.	Senior Assistant	.. Mr. R. M. Ranji, Dip. Agri. (Bombay).
93.	Junior Assistant	.. Mr. S. M. Khalsa, B.Ag. (Bombay).
94.	Junior Assistant	.. Mr. Md. Amin Bhatti, B.Ag. (Bombay).
95.	Junior Assistant	.. Mr. S. G. Kahai, B.Ag. (Bombay).
96.	Junior Assistant	.. Mr. K. G. Rajpur, B.Ag. (Bombay).
97.	Junior Assistant	.. Mr. H. N. Bolina, B.Ag. (Bombay).
98.	Junior Assistant	.. Mr. K. K. Advani, B.Ag. (Bombay).
99.	Junior Assistant	.. Mr. G. H. W. Abbasi, B.Ag. (Bombay).
100.	Junior Assistant	.. Mr. G. M. Advani, B.Ag. (Bombay).

(*iii*) *Scheme for Investigation into Black Headed Cricket in Sind.*

101.	Assistant Entomologist in charge of the Scheme.	.. Mr. Gobind Ram, M.Sc. (Hons.) (Punjab).
102.	Graduate Assistant	.. Mr. V. G. Rajani, B.Ag. (Bom.).

(*iv*) *Scheme for Production of Long Staple Cottons in Sind.*

103.	Cotton Botanist	.. Dr. R. Sankaran, M.A. (Madras), Ph.D. (London), D.I.C.
104.	Senior Assistant	.. Mr. T. J. Chellaramani, B.Ag. (Bombay).
105.	Junior Assistant	.. Mr. D. H. Bhavnani, B.Sc. (Agri.) (Bombay), M.Sc. (Agri.) (Texas, U.S.A.).

(*v*) *Sind Bollworm Scheme.*

106.	Entomological Assistant ..	.. Mr. G. R. Sharma, B.Sc.
107.	Entomological Assistant ..	.. Mr. L. R. Mahindra, B.Sc.
108.	Technological Assistant (Mirpurkhas)	Mr. S. M. Navaz, B.Sc.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

CENTRAL PROVINCES AND BERAR.

(*i*) *Central Provinces and Berar Cotton Breeding Schemes.*

109.	Economic Botanist for Cotton	.. *Mr. S. S. Pande, M.Sc.
110.	Research Officer	.. Mr. S. C. Roy, L.Ag., and Post-Graduate, Pusa.
111.	Research Officer	.. Mr. D. L. Janoria, L.Ag. (Hons.).
112.	Junior Research Assistant ..	.. Mr. D. Y. Bhand, L.Ag. (Hons.).
113.	Junior Research Assistant ..	.. S. L. Nema, B.Ag.
114.	Junior Research Assistant ..	.. Mr. N. P. Deshmukh, B.Ag.

(*ii*) *Scheme for Extension and Marketing of V. 434 Cotton.*

115.	Agricultural Assistant ..	.. Mr. G. C. Tiwari, Certificate Course of Agricultural College, Nagpur.
116.	Agricultural Assistant ..	.. Mr. L. P. Khare, B.Ag.
117.	Agricultural Assistant ..	.. Mr. K. S. S. Chauhan, B.Ag.
118.	Agricultural Assistant ..	.. Mr. G. N. Wardadkar, B.Ag.
119.	Agricultural Assistant ..	.. Mr. M. D. Anandeo, B.Ag.
120.	Agricultural Assistant ..	.. Mr. T. N. Puranik, B.Ag.
121.	Agricultural Assistant ..	.. Mr. V. G. Deodhar, B.Sc. (Agri.).
122.	Agricultural Assistant ..	.. Mr. D. R. Soman, B.Ag.
123.	Agricultural Assistant ..	.. Mr. S. G. P. Tiwari, B.Ag.
124.	Agricultural Assistant ..	.. Mr. B. I. Nema, B.Sc. (Agri.).
125.	Agricultural Assistant ..	.. Mr. K. M. Shingare, B.Sc. (Agri.).
126.	Agricultural Assistant ..	.. Mr. W. P. Sole, B.Sc. (Agri.).

(*iii*) *Scheme for Distribution and Marketing of Buri 107 Cotton.*

127.	Agricultural Assistant ..	.. Mr. J. P. Nema, B.Ag.
128.	Agricultural Assistant ..	.. Mr. P. R. Roday, B.Sc. (Agri.).

MADRAS.

(*i*) *Pempheres Scheme.*

129.	Assistant Botanist	.. Mr. G. Sheshadri Ayyangar, M.A.
130.	Assistant Botanist	.. Mr. V. Ramaswami Mudaliar, B.A.

*Paid by the Provincial Government.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

(ii) Scheme for Improvement of Mungari Cotton.

131.	Gazetted Assistant	Mr. V. K. Subramaniar Mudaliar, L.Ag.

(iii) Scheme for Improvement of Cocanadas Cotton.

132.	Gazetted Assistant	Mr. Balasubrahmanya Ayyar, B.A., B.Sc. (Ag.).
133.	Gazetted Assistant	Mr. A. Raghavan, B.Sc. (Agri.).
134.	Technological Assistant (Coimbatore)	Mr. K. S. Marar, B.A., LL.B.

PUNJAB.

(i) Punjab Botanical Scheme.

135.	Cotton Research Botanist	Mr. Mohammad Afzal* B.Sc.(Agri.) (Punjab), A.I.C.T.A. (Trinidad).
136.	Assistant to Cotton Research Botanist	Dr. Sawan Mal Sikka, B.Sc. (Agri.), Assoc. I.A.R.I., Ph.D. (London).
137.	Field Research Assistant ..	Ch. Mohd. Akbar, L.Ag.
138.	Agricultural Assistant ..	S. Fateh Ali Shah, B.Sc. (Agri.).
139.	Agricultural Assistant ..	Bh. Bantasingh, B.Sc. (Agri.).
140.	Agricultural Assistant ..	Bh. Autar Singh, B.Sc. (Agri.).
141.	Agricultural Assistant ..	Bh. Santokh Singh, B.Sc. (Agri.)
142.	Agricultural Assistant (A Class)	Ch. Mohammad Rashid Khan, L.C. (Course), Munshi Fazil, B.A. (Punjab University).
143.	Agricultural Assistant (A Class)	Ch. Ghulam Rasul, B.Sc. (Agri.).
144.	Agricultural Assistant (B Class)	Mr. S. E. Daniel, L.C. (Course).
145.	Agricultural Assistant (B Class)	Mr. Sikandar Lal Sehgal, B.Sc. (Agri.).
146.	Statistical Assistant	Mr. L. Dwarka Nath Nanda, M.A., B.Sc., (Agra.).
147.	Technological Assistant (Lyallpur)	Mr. S. Raja Raman, B.A. (Madras), M.Sc. (Benares), A. Inst. P. (London).

* Paid by the Provincial Government.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

(*ii*) *Scheme for Improvement of Punjab-American 289F Cotton.*

148.	Agricultural Assistant	..	.. Mr. S. P. Kohli, B.Sc. (Agri.).

(*iii*) *Punjab Root Rot Scheme.*

149.	Agricultural Assistant (B.Class)	..	L. Mulk Raj Sikka, B.Sc. (Agri.)

(*iv*) *Punjab Physiological (Cotton Failure Research) Scheme.*

150.	Plant Physiologist	.. ..	.. Prof. R. H. Dastur, M.Sc., F.L.S.
151.	Biochemist	.. ..	.. Dr. K. M. Samant, M.Sc., Ph.D.
152.	Agricultural Assistant	..	.. Mr. Abdul Ahad, M.Sc. (Agri.).
153.	Agricultural Assistant	..	.. Bh. Sucha Singh, B.Sc. (Agri.).
154.	Agricultural Assistant	..	.. Bh. Mukhtar Singh, B.Sc. (Agri.).
155.	Agricultural Assistant	..	.. Mr. Harmandar Lal Uppal, M.Sc. (Hons.).
156.	Agricultural Assistant	..	.. Bh. Amrik Singh, B.Sc. (Agri.).
157.	Agricultural Assistant	..	.. M. Kanwar Singh Yadava.

(*v*) *Scheme for Cotton Jassid Investigation.*

158.	Agricultural Assistant	..	.. Mr. Manzur Abbas, B.Sc. (Agri.).

UNITED PROVINCES.

United Provinces Botanical Scheme.

159.	Senior Botanical Assistant (Plant Breeding).	..	.. Mr. B. M. Dabral, M.Sc.
160.	Senior Botanical Assistant, Plant Breeding & Genetics of Cotton	..	Mr. R. M. Arora, M.Sc.
161.	Statistical Assistant	.. ..	.. Mr. G. K. Sant, B.Sc.
162.	Technological Assistant (Cawnpore)		Mr. S. Samson, B.Sc.

BENGAL.

Comilla Cotton Scheme.

163.	Cotton Research Officer	..	.. Mr. V. N. Paranjpe, B.Sc. (Allahabad).

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*contd.*

HYDERABAD STATE.

(i) Hyderabad Botanical Scheme.

164.	Assistant Cotton Research Botanist	Mr. D. V. Narayanayya, Dip. Agri. (Poona).
165.	Assistant Cotton Research Botanist	Mr. V. K. Bederker, B.A. (Madras), B.Ag. (Bombay).
166.	Plant Breeding Assistant	Mr. Mohd. Abdul Jaleel.
167.	Technological Assistant (Parbhani)	Mr. K. G. Deo, Inter Arts.

(ii) Scheme for Improvement of Kumpta Cotton.

168.	Senior Research Assistant	Mr. N. R. Yardi, B.Ag. (Bombay).

(iii) Hyderabad Seed Distribution Scheme.

169.	Inspector	Mr. M. V. Chitnis.

BARODA STATE.

(i) Baroda Root Rot Scheme.

170.	Mycological Assistant	Mr. G. H. Desai, B.Ag. (Bombay).
171.	Breeding Assistant	C. S. Krishna Iyer, B.Sc. (Agri.) (Madras).

(ii) Baroda Plant Puller Propaganda Scheme.

172.	Plant Puller Officer, Baroda Dist. ..	Mr. D. H. Jani, B. Ag.
173.	Assistant Plant Puller Officer, Baroda District	Mr. R. S. Patel.
174.	Assistant Plant Puller Officer, Navsari Dist.	Mr. R. N. Desai.

(iii) Baroda B.D. 8 Seed Distribution Scheme.

175.	Cotton Officer, Propaganda Work ..	Mr. K. C. Patwa, B.Ag., F.R.H.S.

LIST OF SCIENTIFIC, TECHNICAL AND OTHER OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1941—*concld.*

(*iv*) *Dholleras Cotton Improvement Scheme.*

176.	Assistant Cotton Breeder, Amreli ..	Mr. A. F. Patel, B.Ag. (Bombay).
177.	Breeding Assistant, Jagudan ..	Mr. R. T. Jog, M.Sc. (Bombay).

(*v*) *Scheme for Marketing of 1027 A.L.F. Cotton.*

178.	Marketing Officer	Mr. J. N. Ambegaonkar, B.A., B. Com., LL.B.

BIKANER STATE.

Bikaner Bengals Cotton Improvement Scheme.

179.	Cotton Assistant	Mr. Arjan Singh, B.Sc.

MYSORE STATE.

Mysore (Doddahathi) Scheme.

180.	Junior Assistant Botanist, in charge of Field operations at Irwin Canal Farm, Mandya	Mr. G. Srinivasa Iyengar, M.Sc. (Mysore).
181.	Sub-Assistant Botanist in charge of Laboratory investigations at Bangalore and Fieldwork at Hebbal Farm	Mr. S. G. Narasimhachar, M.Sc. (Mysore).

CONTENTS.

CHAPTER I.

PAGE.

Introductory 1

CHAPTER II.

Cotton Statistics 5–14

Indian cotton crop classified according to varieties and staple length 5

Indian cotton situation—1941-42 7

Demand for various types of Indian cotton 10

Stocks 10

Indian mill consumption 11

Exports 11

Statistics of cotton pressed 11

Unpressed (loose) cotton statistics 11

Statistics of cotton ginned 12

Improvement of cotton forecasts 12

Report on the accuracy of the all-India cotton forecasts 13

Publications 14

CHAPTER III.

Progress in the Introduction of Improved Varieties of Cotton.— 15–20

(*i*) Bombay 15

(*ii*) Sind 16

(*iii*) Punjab 17

(*iv*) Central Provinces and Berar 17

(*v*) Madras 18

(*vi*) United Provinces 19

(*vii*) Hyderabad State 19

(*viii*) Baroda State 20

(*ix*) Rajpipla State 20

CHAPTER IV.

Improvements in Cotton Marketing, legislation and other protective measures.— .. 21–27

(*i*) Cotton Transport Act 24

(*ii*) Cotton Ginning and Pressing Factories Act 25

(*iii*) Prevention of introduction of foreign cotton pests 26

(*iv*) Cotton Control Acts 26

CHAPTER V.

PAGE.

Research— 28-67

Research on Cotton Technology 28

Fundamental Research 30

Cotton Research in Provinces and States 33

(*i*) *Bombay.*—

(*a*) Broach Cotton Breeding Scheme 33

(*b*) Jalgaon Cotton Breeding Scheme 35

(*c*) Scheme for breeding of wilt-resistant cottons in Surat area .. 36

(*d*) Scheme for improvement of Wagad cotton at Viramgam and Jagudan 37

(*e*) Scheme for improvement of cotton crop in Kaira district 38

(*f*) Scheme for interspecific hybridisation in cottons at Surat .. 39

(*ii*) *Sind.*—

(*a*) Scheme for production of long staple cottons in Sind 40

(*b*) Scheme for Cotton Jassid Investigation 41

(*c*) Scheme for co-ordination of research on Blackheaded Cricket in Sind and Baluchistan 42

(*d*) Scheme for bollworm investigation and clean-up campaign in Sind 43

(*iii*) *Punjab.*—

(*a*) Punjab Botanical Scheme 44

(*b*) Scheme for improvement of Punjab-American 289 F/K. 25 cotton 46

(*c*) Physiological Scheme 47

(*d*) Root Rot Scheme 50

(*e*) Cotton Jassid Investigations in the Punjab 50

(*iv*) *Central Provinces and Berar.*—

Central Provinces and Berar Cotton Breeding Scheme 51

(*v*) *Madras.*—

(*a*) Pempheres Scheme 53

(*b*) Scheme for improvement of Mungari cotton in Madras Province 54

(*c*) Scheme for Improvement of Cocanadas cotton in Madras Province 55

(*vi*) *United Provinces.*—

The United Provinces Botanical Scheme 57

(*vii*) *Bengal.*—

(*a*) Comilla Cotton Scheme 58

(*b*) Scheme for cultivation of long staple cotton in Bengal 58

(*viii*) *Baluchistan.*—

Scheme for co-ordination of Blackheaded Cricket in Sind and Baluchistan 59

PAGE.

(*ix*) *Hyderabad.*—

(*a*) Botanical Research Scheme 60

(*b*) Scheme for Improvement of cotton of Oomras tract in Hyderabad State 61

(*c*) Scheme for improvement of Kumpta cotton 62

(*d*) Scheme for inclusion of Northerns and Westerns cottons in Programme of work of Dry Farming Scheme at Raichur .. 63

(*x*) *Baroda.*—

(*a*) Root Rot Scheme 64

(*b*) Scheme for improvement of Mathio cottons at Amreli 64

(*xi*) *Bikaner.*—

Bengals Cotton Improvement Scheme 65

(*xii*) *Mysore.*—

Mysore (Doddahathi) Cotton Scheme 66

CHAPTER VI.

Seed Distribution and Extension Schemes.— 68–83

Bombay.—

(*a*) Surat Seed Distribution Scheme 68

(*b*) Scheme for Control of Selection 1A cotton 69

(*c*) Jarila Seed Distribution and Extension Scheme 70

(*d*) Deccan Canals (Banilla) Seed Distribution Scheme 72

(*e*) B. D. 8 Seed Distribution Scheme 72

(*f*) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme .. 73

(*g*) Scheme for maintenance of nucleus of pure seed of improved varieties of cotton 74

Sind.—

(*a*) Sind Seed Distribution and Extension Scheme 75

(*b*) Financing of Seed Distribution 76

(*c*) Scheme for maintenance of nucleus of pure seed of improved varieties of cotton 77

Central Provinces and Berar.—

(*a*) Verum Seed Distribution and Marketing Scheme 78

(*b*) Scheme for Distribution and Marketing of Buri 107 cotton 79

(*c*) Maintenance of nucleus of pure seed of improved strains of cotton .. 80

Madras.—

(*a*) Madras Co.3 Seed Distribution Scheme 81

(*b*) Scheme for distribution of H. 1 strain in the Westerns area 81

(*c*) Maintenance of nucleus of pure seed of improved varieties of cotton, Co.2, H. 1 and K. 1. 81

PAGE.

Baroda State.—

(*a*) Baroda (Navsari) Seed Storage Scheme 82

(*b*) Baroda B. D.8 Seed Distribution Scheme 82

APPENDICES.

I. Balance Sheet as at 31st March, 1942; statement of receipts and payments for the year ended 31st March, 1942. 84

II. Members of the Indian Central Cotton Committee 97

III. Stocks of Indian cotton on 31st January, 1942, held by the mills and the trade in Madras Province 101

IV. Indian raw cotton consumed in Indian mills 102

INDIAN CENTRAL COTTON COMMITTEE. ANNUAL REPORT FOR THE SEASON 1941-42.

CHAPTER I.

INTRODUCTORY

THIS is the 21st Annual Report of the Indian Central Cotton Committee covering the period 1st September, 1941, to 31st August, 1942. Constituted by the Government of India in 1921, the Committee was originally purely an advisory body. With its incorporation under the Indian Cotton Cess Act in 1923, however, it became an administrative body having at its disposal funds for the improvement and development of the growing, marketing and manufacture of cotton in India. The need for a central body like this requires little emphasis. The Cotton Industry in India must be taken as a whole; it cannot be considered provincially only as trade changes in one province may affect producers in another, whilst any change in the cotton cultivation in one province undoubtedly affects the cotton trade and the cotton spinning industry throughout India.

The funds of the Committee are derived from the cotton cess of two annas (four annas for the first three years) levied on every bale of Indian cotton exported from or consumed in mills in British India, on the principle that special expenditure for the benefit of a particular industry should be met by that industry. Of the total receipts of the Committee up to the 31st March, 1942, amounting to Rs. 1,70,72,344/-, Rs. 1,45,18,640/- represent collections from the cotton cess.

The funds at the disposal of the Committee are allotted for research into cotton problems mainly of all-India importance and for the development, extension and marketing of improved varieties of cotton. The aim has always been to supplement and not supplant the work of the Agricultural Departments in the cotton growing provinces and Indian States and, though, as a matter of convenience, certain lines of demarcation have been laid down regarding the investigations which the Committee considers most appro-

priate for its grants, the general policy is to give assistance in the direction where it is most needed in the carrying out of a co-ordinated policy of cotton improvement. Touch is maintained with the work done under the various schemes by means of annual progress reports submitted by the officers in charge of schemes; these reports are critically examined by the appropriate sub-committees and suggestions made for the future conduct of the work.

There was no change in the administration; Mr. D. N. Mahta continued as Secretary of the Committee throughout the year and Dr. Nazir Ahmad as Director of the Committee's Technological Laboratory. The receipts during the year amounted to Rs. 6,75,787 and the total expenditure to Rs. 8,72,781. A statement showing the receipts and expenditure of the Committee as well as the Balance Sheet for the year as at 31st March, 1942, is given in Appendix I. As explained in the previous reports, the day-to-day administration of the Committee is carried on in consultation with the Standing Finance Sub-Committee which exercises its powers under Rule 12 (1) of the Indian Cotton Cess Rules and is the principal executive body of the Committee. Members of this Sub-Committee during the period under review were Sir Chunilal B. Mehta (Vice-President), Chairman; Mr. P. M. Kharegat (*ex-officio*); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Sir Chunilal V. Mehta; Mr. J. L. Hurschler; Mr. W. J. Jenkins; Rao Bahadur Sir Madhaorao Deshpande and Mr. Chandulal P. Parikh. Matters of a general nature not involving finance are disposed of with the help of the Local Sub-Committee which is composed of the local members and those residing within easy reach of Bombay. The members of this Sub-Committee during the year under review were the President (Mr. P. M. Kharegat); the Vice-President (Sir Chunilal B. Mehta); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Sir Chunilal V. Mehta; Mr. J.L. Hurschler; Mr. L. F. H. Goodwin; Mr. Chandulal P. Parikh; Mr. W. J. Jenkins; Mr. A. P. Darlow; Rao Bahadur Sir Madhaorao Deshpande and Mr. S. T. More.

A list of the members constituting the Committee and the various interests they represent as on 31st August, 1942, is given in Appendix II. Under the Indian Cotton Cess Rules, members, who are not *ex-officio* members, hold office for three years and one-third of their number retire each year in rotation. The term of office of additional members appointed by the Governor-General-in-Council under Section 4 (xi) of the Indian Cotton Cess Act is three years or such lesser period as may be specified in the notification. The functions

of the various sub-committees have been dealt with at length in previous Annual Reports and repetition here appears unnecessary. The composition of the Sub-Committees as on 31st August, 1942, is given in Appendix II.

The Central Cotton Committee met twice during the year under review. The most important subject which received consideration at the first meeting held on the 23rd and 24th January, 1942, was the question of the measures that should be taken to safeguard the position of Indian cotton in view of the loss of markets in Europe and the Far East as a result of the war. After a full dress debate, the following resolution was unanimously passed by the Committee :—

> "In view of the necessity and urgency of avoiding any further glutting of the Indian cotton market with short and fair staple cotton hereafter, the buyers of which have been cut off from the Indian market owing to the present hostilities which may run for a period which cannot be estimated at present, the Indian Central Cotton Committee requests the Government of India to urge all Provincial Governments and States in India, especially those in areas where short and fair staple cotton is being grown, to reduce the existing acreage under such cotton forthwith by at least 50 per cent. As alternative to short and fair staple cotton, such other crops may be encouraged as may suit the conditions of each area, preference being given to food grains, adequate stocks and reserves of which will continue to be a matter of vital national importance for a number of years to come. To stimulate and accelerate such change Provincial Governments and States should be urged to subsidise the same by such means as may be most effective according to local conditions in each Province and State, including the supply of free or cheap seeds and the provision of funds and facilities for the sinking of new and the repair of old wells. The Committee requests every Provincial and State Government concerned to notify the public regarding the action taken by them as early as possible—not later than 1st March next."

At the second meeting held in July 1942, the principal subject considered was that relating to the difficulties experienced by cotton ginning and pressing factories in obtaining their requirements of baling hoops and coal and other types of fuel. The recommendations made by the Committee in this connection are embodied in the following resolution :—

> "The Indian Central Cotton Committee is of the opinion that the orderly and prompt marketing of the cotton crop is of paramount importance to the cotton cultivator. For this purpose, it considers it essential that ginning and pressing factories should be provided with the necessary facilities for their working especially in respect of coal and other types of fuel used by them. To secure the object in

view, the Committee respectfully requests the Government of India to take early steps to place on the Priority List the requirements of cotton ginning and pressing factories, in particular coal and other kinds of fuel in good time before the commencement of ginning and pressing operations in each Province."

The financial position of the Committee was also reviewed at this meeting and the decisions arrived at are contained in the following resolution :—

" The Indian Central Cotton Committee, while agreeing with the view expressed by the Government of India regarding the desirability of maintaining a minimum balance of Rs. 9 lakhs, feels that the strict application of this prescription would not be in the best interests of the cotton cultivator, as urgent and necessary work might, as a result, be held up or indefinitely postponed. The Committee respectfully urges, therefore, if for good and sufficient reasons it considers that new work should be undertaken or that a scheme already in operation should continue, thereby necessitating incursions into the minimum balance, that the Government of India would be pleased to at least restore the minimum balance to the prescribed limit, as and when required, by granting a subsidy to the Committee from the Cotton Fund recently created from the proceeds of the additional import duty imposed on raw cotton for the purpose of financing measures for the benefit of the growers of certain types of cotton which were exported in large quantities to the Far East before the outbreak of the present war with Japan."

Mr. P. M. Kharegat, Sir Chunilal B. Mehta, Mr. W. J. Jenkins, Sir Purshotamdas Thakurdas, Sir Chunilal V. Mehta and Mr. D. N. Mahta represented the Committee on the Board of Governors of the Institute of Plant Industry, Indore, during the financial year ending 31st March, 1942. Mr. Roger Thomas represented the Committee on the Imperial Council of Agricultural Research. Under Article 51, as amended, of the Articles of Association of the East India Cotton Association, the Committee is entitled to nominate from amongst its growers' representatives, three persons whether members of the Association or not, not having dealings in forward contracts, as directors of the Association. Rao Bahadur Sir Madhaorao Deshpande, Sardar Bahadur Gurbachan Singh and Sardar Rao Bahadur Bhimbhai R. Naik were elected by the Committee for the cotton year under review.

Despite war conditions, the research and other useful activities of the Committee continued unhampered and good progress was recorded in each branch. A brief account of the work done and the results achieved during the year is given in the chapters that follow.

CHAPTER II.

COTTON STATISTICS.

On the average of the five years ending 1940-41, production of Indian cotton represented some 17% of the total world production, the share of the United States of America being 42%. The total area under cotton in India during the year was 24,151,000 acres, showing an increase of 840,000 acres as compared with the previous year. The total estimated out-turn for 1941-42 was 6,127,000 bales, against 6,080,000 bales in 1940-41, the average yield per acre being 101 and 104 lbs., respectively. The out-turn was higher than that in the previous year in the major cotton growing provinces and States except Sind, the United Provinces and Hyderabad State.

The ascertained area under improved strains of cotton was 8,568,000 acres or 35% of the total, against 28% in the previous year. The improvement effected in the staple of the Indian cotton crop as a result of the introduction and extension of superior varieties of cotton will be apparent from the following table :—

Indian cotton crop classified according to varieties and staple length.

(Based chiefly on the ' Estimates of Area and Yield of Principal Crops in India' and ' Cotton Forecasts ' published by the Department of Commercial Intelligence and Statistics in India.)

(Quantities are in thousand bales* of 400 lbs. each.)

Descriptions of cotton. (1)	Average 1922-27. (2)	Average 1936-41. (3)	1941-42. (4)	% increase (+) or decrease (—) of col. 4 over col. 2. (5)
Short staple—below $\frac{7}{8}$"				
(1) Bengals	905	1,207	932	
(2) Oomras	1,890	1,300	1,198	
(3) Central India	324	262	291	
(4) Broach (Part)	65	224	285	
(5) Dholleras	525	364	421	
(6) Kumpta & Upland (Part) ..	(*a*)	32	35	
(7) Bijapur & Bagalkot Jowari }	(*b*)	152	57	
(8) Westerns (Part) .. }			92	
(9) Warangal & Cocanadas ..	49	28	34	
(10) Salems	30	17	8	
(11) Chinnapathi }	39	45	1	
(12) Comillas }			42	
Total short staple } Quantity	3,827	3,631	3,396	—11
% on "Total-All Staples."	*70*	*65*	*55*	

* Statistical bales containing 400 lbs. of cleaned (lint) cotton.

(*a*) Included under item (19), separate figures not being available.

(*b*) ,, ,, ,, (20) ,, ,, ,, ,,

Descriptions of cotton. (1)	Average 1922-27. (2)	Average 1936-41. (3)	1941-42. (4)	% increase (+) or decrease (—) of col. 4 over col. 2. (5)
Medium and Long staple—$\frac{7}{8}$" and above				
(13) Americans—Punjab and Sind (staple 1" and above) † ..	..	211	328	
(14) Americans—Punjab and Sind (staple below 1")	264	843	1,031	
(15) C. P. and Berar Verum ..	..	41	134	
(16) Hyderabad Gaorani	332	139	142	
(17) Broach (Part)	214	6	5	
(18) Surti		165	151	
(19) Kumpta & Upland (Part) ..	259	167	186	
(20) Westerns (Part)	251	52	61	
(21) White & Red Northerns ..			17	
(22) Tinnevellies (including Karungannies)	155	146	170	
(23) Cambodias	147	175	256	
(24) Jarila	..	16	232	
(25) Buri	..	7	18	
Total—Medium & Long staple { Quantity	1,622	1,968	2,731	+68
Total—Medium & Long staple { % on "Total-All Staples"	*30*	*35*	*45*	
Total—All Staples	5,449	5,599	6,127	+12

† Includes 'Punjab-American 289-F/K.25 'Sind Sudhar (Sind-American 289-F-1), and 'Punjab-American 289-F/43.'

It will be seen that the proportion of cotton of staple length $\frac{7}{8}$" and above to the total production increased from 30% in the quinquennium 1922-27 to 35% in the quinquennium 1936-41; the proportion in 1941-42 was 45% against 36% in 1940-41. The production of 'medium and long staple' cotton in 1941-42 increased by 1,109,000 bales or 68% as compared with 1922-27; under "short staple' there was a reduction of 431,000 bales or 11%. The production of cotton of staple length '1" and above,' which was practically nil in 1922-27, amounted to 415,000 bales in 1941-42.

A noticeable improvement in the yield per acre has also taken place as will be seen from the following table, in which two sets of figures, one based

on the official crop forecasts and the other on the figures of actual crop accounted for by mill consumption, exports and extra-factory consumption, are given :—

Year. (1st Sept—31st Aug.)	Area (Thousand acres.)	Production Government estimates. (Thousand bales of 400 lbs. each.)	Yield per acre. (lbs.) Col. 3 / Col. 2.	Approximate (commercial) crop. (Thousand bales of 400 lbs. each.)	Yield per acre calculated from approximate (commercial) crop. (lbs.) Col. 5 / Col. 2.
1	2	3	4	5	6
Average 1922-27 ..	24,723	5,449	87	*5,954	96
„ 1927-32 ..	24,738	5,206	84	*5,851	95
„ 1932-37 ..	23,912	5,315	89	*6,447	108
1937-38 ..	25,746	5,737	89	†6,370	99
1938-39 ..	23,490	5,051	86	†6,051	103
1939-40 ..	21,580	4,909	91	†5,884	109
1940-41 ..	23,311	6,080	104	†7,032	121
1941-42 ..	24,151	6,127	101	†6,949	115
Average 1937-42 ..	23,656	5,581	94	†6,457	109

* Calculated from mill consumption (*a*)+exports (*b*)+extra-factory consumption (*c*). Variation in stocks has not, however, been taken into account.

(*a*) Mill consumption in Burma included up to 31st March, 1937.

(*b*) Includes exports from Burma up to 1934-35.

(*c*) The new figure for extra-factory consumption, *viz.*, 450,000 bales for the whole of India, based on enquiries conducted by the Committee, in selected areas, has been used throughout.

† Best estimate of the crop as arrived at by the Indian Central Cotton Committee in connection with the annual post-mortem examination of all-India cotton forecasts.

From the second set of figures given in column 6, it will be seen that the average yield per acre rose from 96 lbs. in the quinquennium 1922-27 to 109 lbs. in the quinquennium 1937-42. The average yield in 1941-42 was 115 lbs. per acre against 121 lbs. in 1940-41.

A report on the estimated production of cotton according to staple length for 1941-42 season was issued in July 1942; the trade estimates of the crop were also presented in this report. Of the official estimate of 6,025,000 (since revised to 6,127,000) bales (compared with the trade estimate of 6,642,000 bales), 7% was of staple length 1″ and above and 38% of staple $\frac{7}{8}$″ to 31/32.″

INDIAN COTTON SITUATION—1941-42.

The Indian cotton position at the commencement of the season was overshadowed by the impending loss of the Far Eastern markets,

consequent upon the freezing of Japanese assets towards the close of the last season. With the entry of Japan into the War in December 1941, the problem of short staple cotton became a live issue. During the three years ending August 1939, the annual exports to Japan averaged some 15 lakhs bales, most of which consisted of short staple cotton. The sudden closure of this outlet made the disposal of this type of cotton a problem of the first magnitude. Various remedies were suggested to deal with the situation, such as the lowering of the specifications of goods required by the Supply Department, the use of short staple cotton for the manufacture of durries, blankets, nitro-cellulose, cloth for road-making, ditch and canal lining, etc. The possibility of giving chemical finishes to short staple cotton yarns and fabrics was also suggested. The acceptance by the Government of India of the Committee's recommendation regarding relaxation of the specifications of cotton goods required by the Supply Department resulted in an offtake of 4 lakhs bales of short staple cotton but this merely touched the fringe of the problem. The wider aspect of the question of adjusting the supply of short staple cotton to probable demand was discussed at some length by the Committee at its meeting in January 1942, when a resolution was unanimously passed recommending *inter alia* that the Government of India should request all Provincial Governments and States in India to reduce the existing acreage under short and fair staple cotton forthwith by at least 50 per cent. 'Short and fair staple cotton' was defined as cotton comprising the whole of Oomras (excluding Jarila and Verum) and Bengals ; Comillas ; Hyderabad Westerns ; Cocanadas and Warangal ; Central India (excluding Malvi) and Mathia.

On the 29th January, 1942, the Government of India announced the creation of a special fund, called the "Cotton Fund," from the proceeds of the levy of an additional duty of one anna per lb. on all imported cotton, with a view to financing measures for assisting the grower of certain types of cotton which used to be exported in large quantities to the Far East prior to the outbreak of war with Japan. The object of this measure was not merely to steady the market by making purchases of raw cotton of the types concerned, but also to assist the cultivator to change over from short staple cotton to food crops. A "Grow More Food" campaign was started on a country-wide scale, and the cultivator was advised to reduce the area under short staple cotton and grow food grains instead. These measures, together with the announcement by the Government of Bombay of their intention to stop facilities for the movement of unwanted short staple cotton to Bombay and the replacement of the Broach, Oomras and Bengals Contracts by a new Contract—Indian Cotton Contract—with Fine Jarila $\frac{3}{4}$" staple as the basis, were largely responsible for bringing about a reduction in the

production of short staple cotton. In the first all-India cotton forecast* for 1942-43 published in August 1942, the total cotton acreage was estimated at 11,089,000 showing a reduction of 11% on the previous year.

As regards the statistical position of Indian cotton, the season started with a carryover of 12·0 lakhs bales (400 lbs. net each) with the trade, excluding the spinning mills. The actual crop of 1941-42, on the basis of cotton pressed and unpressed cotton consumed in mills amounted to 65·0 lakhs bales (excluding extra-factory consumption of 4·5 lakhs bales), of which 31·3 lakhs were estimated to have been of staple length $\frac{7}{8}$" and above. The consumption of Indian cotton by mills, amounting to 40·3 lakhs bales, constituted a new record, being 4·1 lakhs bales higher than in the previous season. The receipts at mills of Indian cotton on the basis of voluntary returns, amounted to 40·8 lakhs bales (400 lbs. net each). The actual receipts, however, were estimated to have been some 43·0 lakhs bales, including 18·1 lakhs bales below $\frac{7}{8}$" in staple.

With the loss of the continental and Japanese markets for Indian cotton, the only important export outlets left were the United Kingdom, U. S. A. and Australia. The total exports during the season amounted to 8·7 lakhs bales including 5·1 lakhs bales below $\frac{7}{8}$" in staple.

On the basis of the figures of actual production, mill consumption and exports, the calculated carryover of Indian cotton with the trade, excluding spinning mills, at the end of the season, works out to 25·3 lakhs bales as shown below :—

	In lakhs of bales of 400 lbs. net (Excluding extra-factory consumption.)		
	Total.	$\frac{7}{8}$" and above.	Below $\frac{7}{8}$".
Stocks held by the trade (excluding spinning mills on 31st August, 1941)	12.0	2.9	9.1
Probable production in 1941-42	65.0	31.3	33.7
Total supply	77.0	34.2	42.8
Estimated receipts by mills in 1941-42	43.0	24.9	18.1
Exports during 1941-42	8.7	3.6	5.1
Total distribution	51.7	28.5	23.2
Estimated stocks held by the trade on 31st August, 1942	25.3	5.7	19.6

* The Final (April) Cotton Forecast for 1942-43 published on the 30th April, 1943, estimates the total acreage at 18,812,000 and the yield at 4,554,000 bales showing a reduction of 22 and 26% respectively, on the estimates of the previous year.

DEMAND FOR VARIOUS TYPES OF INDIAN COTTON

As usual, statistics relating to internal and export demand for various types of Indian cotton were compiled from information furnished on a voluntary basis and published in Statistical Leaflets Nos. 3 and 4 (1941-42). It is hardly necessary to emphasise the importance of these statistics to the trade and industry as well as to those entrusted with the responsibility of shaping and directing the cotton policy of the country. Receipts at mills of Indian cotton, during the season, were nearly the same as in the previous year, while exports showed a shrinkage of about 12 lakhs bales. The reduction of 4·4 lakhs bales under export of long and medium staple cotton was to some extent offset by the increase of 2 lakhs bales in the offtake of such cotton by mills. Under short staple cotton both exports and mill receipts recorded decreases by 7·6 and 2·4 lakhs bales respectively.

STOCKS.

The information collected in respect of stocks held on the 31st August, 1942, was published in Statistical Leaflet No. 2 (1941-42). Stocks of Indian cotton held in India by the trade at the end of the season 1941-42, on the basis of voluntary returns, amounted to 14·9 lakhs bales, showing an increase of 2·7 lakhs bales on the previous year. The figures of stocks of cotton held by the trade do not cover certain areas while the information collected for some of the other areas is not complete. It is considered that the figure of 14·9 lakhs bales is very low as on the basis of the figures of actual crop exports, mill receipts, etc., the carryover on the same date is estimated at some 25·9 lakhs bales ; one important cotton firm, in fact, puts the figure as high as 29 lakhs bales. The discrepancy has been examined and is accounted for mainly by the incompleteness of the figures for the Provinces of Bombay, the Punjab and the United Provinces and the States of Central India. Steps are, however, being taken to remedy the position, as far as possible.

As the season adopted for the cotton crop of the Madras Province is the year ending 31st January, figures of stocks held in the province on this date are collected annually in addition to the figures relating to the 31st August. The relevant figures for the 31st January, 1942, together with comparative details for previous years, are given in Appendix III.

As in the past, mills, trade associations, market committees and other authorities gave valuable assistance in the collection of figures of stocks of

cotton held in the country at the end of the season. Much ground, however, still remains to be covered before the statistics can be claimed to be complete.

INDIAN MILL CONSUMPTION.

Figures of consumption of Indian cotton in mills in British India and Indian States for the years 1927-28 to 1941-42, based on the monthly statements issued by the Committee, are given in Appendix IV. The total consumption of Indian cotton in mills in India during the season under report, *viz.*, 4,025,232 bales, showed an increase of 408,085 bales as compared with the previous season, and constitutes yet another record. Bombay Province alone accounted for about 45% of the increased consumption. All the Provinces in British India except Bengal recorded increases. Indian States shared 17% of the increased consumption which was mainly in Hyderabad, Mysore and Indore States.

EXPORTS.

The exports of Indian cotton from British India during the season totalled 873,000 bales against 2,013,000 bales in 1940-41. On the average of the three financial years ending 1940-41 the value of cotton (including waste) exported from British India formed 36% of the total value of "Raw materials and produce and articles mainly unmanufactured" exported, and 14% of the total value of all merchandise exported.

STATISTICS OF COTTON PRESSED.

During the season under review, 4,207,681 bales of cotton were pressed in British India and, 1,729,102 bales in Indian States, making a total of 5,936,783 bales for all-India; the corresponding figures for 1940-41 were 4,195,719, 1,779,554 and 5,975,273 bales, respectively. For India as a whole, the average net weight per bale of cotton pressed during the season under report amounted to 391 lbs., against 392 lbs. in the previous season.

UNPRESSED (LOOSE) COTTON STATISTICS.

The statistics of cotton pressed do not account for the whole of the Indian cotton crop as, apart from the quantity utilised for extra-factory consumption, chiefly in the form of *kapas*, mills situated in cotton growing areas often use considerable quantities of ginned, unpressed cotton. During the year, 562,053 bales of unpressed cotton were consumed in mills in India against 523,001 bales during the preceding year. The relevant figures for 1927-28 to 1941-42 are given in Appendix IV to this report.

STATISTICS OF COTTON GINNED.

The figures of cotton pressed do not cover the entire crop as, apart from ginned unpressed cotton consumed in spinning mills for which figures are available, both ginned unpressed cotton and *kapas* are also utilised for domestic purposes, such as, hand-spinning, making of quilts, mattresses, etc., for which there are no reliable data. If, however, ginning returns could be instituted, all that would be necessary for arriving at the actual crop would be to estimate the quantity of *kapas* used for domestic purposes. The two returns would at the same time serve as a check on each other. The submission of such returns is already in force in the Central Provinces and Berar, Bombay Province and Sind. The necessary amending legislation has been passed by the United Provinces Government. During the year, the Central Government passed the Cotton Ginning and Pressing Factories (Amendment) Act, 1942. The new Section 5A, which has been inserted in the original Act of 1925, provides for the submission of weekly returns of cotton ginned in Chief Commissioners' Provinces only and at the same time empowers any Provincial Government by notification in the Official Gazette to bring this section into force in that Province.

IMPROVEMENT OF COTTON FORECASTS.

The all-India cotton forecasts of the 1940-41 season were, as usual, subjected to a post-mortem examination by the Cotton Forecast Sub-Committee of the Indian Central Cotton Committee, at the close of the season, with a view to detecting sources of errors and suggesting remedial measures. The Sub-Committee had also before it the note submitted by the Director General of Commercial Intelligence and Statistics on the various points raised during the discussion on the subject at the previous meeting. It was decided that in the present circumstances, the method used at present in determining the actual production in connection with the annual post-mortem examination should be continued and the position re-examined after ginning returns for all-India become available, when it would be possible to check the results arrived at by the two methods with this independent source. It was further agreed that efforts should be made to obtain from commercial firms their estimates of the commercial crop for the use of the forecasting authorities to help them in deciding whether any correction should be applied to the primary reports of anna valuation.

In connection with the post-mortem examination, the inaccuracy of the pressing figures of Sind for 1940-41 was brought to light and investigation

showed that this was due to the failure on the part of some of the factories to submit the returns and to inaccurate returns in the case of some others. Suitable action in the matter has been taken. The Committee endorsed the proposal of the Sind Government to replace the system of anna valuation, for purposes of forecasts, by the direct method of assessment of yield per acre.

In order to improve the cotton forecasts, it is the considered view of the Committee that a systematic and scientific revision of the standard yield figures is necessary. A scheme for crop estimating survey on cotton in the Central Provinces and Berar has accordingly been sanctioned by the Committee for one year with the object of providing a suitable sampling technique for crop-cutting experiments on cotton, by determining the most suitable plot size and density for obtaining estimates of average yield with the desired level of accuracy.

At one of its meetings during the year under review, the Committee considered a note by the Director General of Commercial Intelligence and Statistics, on the procedure followed at present in India in the preparation of cotton forecasts and recommended that the February forecast should, in future, be designated as the "Fourth" Forecast and the April one as the "Final" Forecast.

As in the past, the estimates of the cotton crop were received by wire from the Director General of Commercial Intelligence and Statistics and released in Bombay at a time previously fixed to synchronise with the time of their release in Calcutta.

REPORT ON THE ACCURACY OF THE ALL-INDIA COTTON FORECASTS.

As usual, a report on the accuracy of the all-India cotton forecasts of the 1940-41 season was published in August. According to this report, the commercial crop of 1940-41 was estimated to be in the neighbourhood of 7,032,000 bales, whilst the figure forecasted in April 1941 was 5,785,000 bales. The forecast estimate was thus lower by 18 per cent on the basis of the actual crop as arrived at by the Committee; this was probably due to the observed underestimation in the forecasts of the United Provinces, the Punjab, Sind, Bombay Province, Madras Province and Hyderabad State.

PUBLICATIONS.

The undermentioned statistical publications were issued during the year under report :—

(1) *Statistical Leaflet No.* 2.—Eighth Issue (1940-41), "Stocks of Indian raw cotton held in India by the mills and the trade on 31st August, 1941."

(2) *Statistical Leaflet No.* 3.—Eighth Issue (1940-41), "Receipts at mills in India of raw cotton classified by varieties—1940-41 season."

(3) *Statistical Leaflet No.* 4.—Eighth Issue (1940-41), "Exports by sea of Indian raw cotton classified by varieties—1940-41 season."

(4) *Statistical Leaflet No.* 1.—Ninth Issue (1941-42), "Report on the staple length of the Indian cotton crop of 1941-42 season."

(5) *Statistical Leaflet No.* 5.—Fifth Issue (1940-41), "Report on the accuracy of the all-India cotton forecasts of 1940-41 season."

(6) *Statistical Bulletin No.* 11.—(1940-41), "Supply and Distribution of the various types of Indian cotton during the season 1940-41."

CHAPTER III.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON.

The improvement of the quality of cotton has always ranked foremost in the programme of work of the Committee. In the attainment of this object, the needs of the Indian mill industry which consumes nearly three-fifths of the total Indian crop have constantly been borne in mind. The success achieved in this direction may be gauged from the fact that practically the entire requirements of the industry for cotton of staple length 1″ and below are now being met from indigenous production. At the same time steps are being taken to increase the production in the country of cotton of staple length over 1″, of which over 6 lakhs bales are imported from abroad annually. The following paragraphs deal briefly with the progress made in the introduction of improved varieties of cotton in the various Provinces and States of India as a result of the joint efforts of the Central Cotton Committee and the Provincial and State Departments of Agriculture. The information is confined mainly to acreage and production in the interests of paper economy; for fuller details, reference to previous reports will be necessary.

BOMBAY.

During the year under review, the total area under cotton in the Bombay Province, including Indian States except Baroda, was 6,107,000 acres, of which the improved varieties constituted roughly 1,670,000 acres or 26%. The position with regard to the various cotton growing tracts is given below; the figures in brackets after each tract indicate the area under cotton in the tract in 1941-42 :—

Kumpta and Upland tract (including Bijapur District, 677,000 acres) (1,836,000 acres).—Two important varieties, *viz.*, *Jayawant* and *Gadag* 1, are grown in this tract. The chief centres of distribution of *Jayawant* are Hubli, Navalgund and Haveri in Dharwar District; Bailhongal and Athani in Belgaum District; and Walva and Tasgaon taluqs in Satara District. Gadag 1 is chiefly grown in the Gadag and Ron taluqs of Dharwar District. The area under *Jayawant* and *Gadag* 1 in this tract (including *Jayawant* grown in Bijapur District) during the year was about 809,000 and 187,000 acres, respectively. Roughly 54 per cent of the tract, including Bijapur

District, was covered by improved strains. The production of these two varieties was estimated at 99,000 and 15,000 bales, respectively.

Barsi-Nagar tract (187,000 acres).—*Banilla* is the improved variety grown in this tract and covered an area of about 6,000 acres during the year. *Jarila* cotton evolved for the Khandesh tract is also spreading in this tract.

Khandesh tract (1085,000 acres).—Khandesh *Banilla* was the original improved strain evolved for this tract, but owing to its susceptibility to wilt, its extension has been abandoned in favour of *Jarila* which is a selection from *Verum* evolved under the Jalgaon Cotton Breeding Scheme. During the year under review, Jarila fetched an average premium of Rs. 74 ' on ' Broach. The estimated area under it during the year was some 552,000 acres, including natural spread, the production being 150,000 bales. Out of the pure seed produced on Government Farms and in controlled areas, the quantity stocked by the Agricultural Department and approved stockists for distribution in 1942-43 season was 53,30,000 lbs.

Surti tract (502,000 acres).—1027 A. L. F. is the improved cotton grown in this area. The area under Departmental seed of this variety during the year was 70,000 acres, excluding Baroda State; the area under natural spread is not known. The Committee finances a scheme for grading and marking of 1027 A. L. F. cotton in the Surat protected area and 5,964 bales were sold under ' Agmark ' at premiums ranging from Rs. 5 to Rs. 27 on the *local*.

Broach tract (488,000 acres).—B. D. 8 is the improved strain in this tract which was grown on 16,000 acres during the year; the production was estimated at 5,000 bales.

SIND:

The total area under cotton in Sind, including Khairpur State, was 999,000 acres, of which Sind-American occupied 820,000 acres and Sind *desi* 179,000 acres. The area under improved varieties was about 82% of the total.

In the Sind-American tract four types of cotton are grown, *viz.*, Sind-American 4F, Sind *Sudhar* (289-F-1), Sind-American 289F types (other than Sind *Sudhar*) and Sind-American 98. The area and yield of Sind-American 4F were 38,000 acres and 18,000 bales, respectively. There were some

285,000 acres under Sind *Sudhar* during the year, the estimated yield being 158,000 bales. Under Sind-American 289F types (other than Sind *Sudhar*), are included the improved varieties variously known as K. T., N. T., L.S.S., etc. The propagation of these strains has been discontinued by the Agricultural Department in favour of Sind *Sudhar*. Sind-American 98 is considered to be the most suitable type for cultivation in the new cotton area on the Right Bank of the Indus. There were some 50,000 acres under it during the year, yielding about 22,000 bales.

The improved Sind *desi* cotton known as Sind N. R. or 27 W. N. is the standard *desi* cotton of Sind and is grown in the Nawabshah District and the upper part of Hyderabad District. The area under it during the year was 112,000 acres which is 63% of the total *desi* acreage.

PUNJAB.

The total area under cotton in the British districts of the Province was 2,801,000 acres of which 1,561,000 acres were under Punjab-American and 1,240,000 acres under Punjab *desi*. The total estimated area of about 2,240,000 acres (*i.e.*, 80% of the total cotton acreage) under improved varieties during the year was distributed as under :—

		Acres.
(*a*)	*Punjab-American varieties* :—	
	(*i*) 4F	838,000
	(*ii*) L. S. S., 289F/K. 25 and 289F/43	723,000
	Total	1,561,000
(*b*)	*Improved desi cottons* :—	
	(*iii*) Mollisoni and M. 60 A2	665,000
	(*iv*) Sanguineum	14,000
	Total	679,000

CENTRAL PROVINCES AND BERAR.

The total area under cotton in the Central Provinces and Berar during 1941-42 was 38,05,000 acres. Improved varieties occupied some 822,000 acres or roughly 22% of the total. The chief improved varieties are V. 434, *Jarila* and *Buri* 107.

V. 434 is the best all round strain available at present and is grown chiefly in Nimar, Wardha and Nagpur districts and Berar. During the year it fetched a premium of Rs. 131 per *candy* over the local Oomras. The area under all *verum* strains was 365,000 acres during the year under report.

Jarila, an improved Verum type evolved for the Khandesh tract, is finding much favour with the cultivators in the adjoining tracts, particularly Berar. The total area under this cotton in the Central Provinces and Berar in the past year amounted to 274,000 acres.

Buri 107, a selection from acclimatised *Upland* American cotton, is grown chiefly in the Burhanpur Tahsil of the Nimar District for which it has been found to be particularly suitable. The area under it during the year was 60,000 acres.

MADRAS.

The total area under cotton in the Madras Province (including Pudukkottai and Banganapalle States) was 2,556,000 acres of which 613,000 acres (or 24%) were under improved superior strains. The position of improved strains in the different tracts is dealt with below ; the figures in brackets after each tract refer to the area under cotton in 1941-42.

Cambodia tract (636,000 acres).—Cambodia, an acclimatised American Upland cotton, is the original improved type introduced in this tract. This variety is now being replaced by several better strains such as *Cambodia* Co.2, Co. 3 and Co.4, etc. Compared with ordinary Cambodia, Co.2 is estimated to benefit the grower to the extent of Rs. 15 per acre. Another strain 920 is now gradually replacing Co.2 in parts of Coimbatore District, on account of its sturdier growth and lesser susceptibility to shedding. The area under Co.2 (including 920) in 1941-42 was 301,000 acres. The Cambodia Uganda Crosses, Co.3 and Co.4, are both earlier and more prolific than and superior in quality to either Co.2 or 920. In 1941-42, Co.3 and Co.4 were grown in Ramnad, South Arcot and Tinnevelly Districts over an area of 26,000 acres, the estimated production being 14,000 bales.

Tinnevellies tract (724,000 acres).—The improved *Karunganni* strains at present being propagated are C. 7, A. 10 and K.1, which were originally evolved by selection in *Karunganni* at the Koilpatti Agricultural Research Station. K.1 was evolved by re-selection in C. 7 in a year of drought ; besides being earlier and hardier than the latter, it does better than either C. 7 or

A. 10 under adverse conditions and is not affected by February rains. Further, it has been found to give a higher yield than the local cottons. Owing to its earliness, drought resistance and non-shedding qualities, it is gaining popularity and is expected to replace both C. 7 and A. 10. The area under improved Karunganni in 1941-42 was 213,000 acres, the estimated production being 32,000 bales.

Westerns tract (859,000 acres).—The improved strain grown in this tract is H. 1, which is a selection from another strain H. 25. It is grown chiefly on the black soils of Bellary District and in parts of Anantapur and Cuddapah Districts. There were some 312,000 acres under it in 1941-42.

Northerns tract (164,000 acres).—N. 14, the improved strain grown in this tract, was evolved by selection from the Northerns cottons and is considered to be one of the finest indigenous cottons in India. There were 42,000 acres under it in 1941-42.

UNITED PROVINCES.

The total area under cotton in the Province during 1941-42 was 439,000 acres. The improved varieties, C. 520 and Perso-American, occupied 31,000 acres or 7% of the total. C. 520 was grown on 22,000 acres.

HYDERABAD STATE.

The total area under cotton in the State during 1941-42 was 3,283,000 acres, of which 1,309,000 acres (or 40%) were occupied by the improved varieties, *Gaorani* 6, Parbhani-American, *Jarila* and *Jayawant*.

Out of 837,000 acres in the Gaorani tract, Gaorani 6 covered an area of 606,000 acres during the year. Pure seed of Parbhani-American, which is a selection from the local American varieties, is being distributed, on *taeavi* system, in the Aurangabad District. The area under it during the year was 16,000 acres. It is estimated that the improved variety, *Jarila*, was grown on an area of about 5 lakhs acres in the State, during the year under report.

Jayawant (same strain as that grown in the Kumpta tract of the Bombay Province) is being extended chiefly in the *Kumpta* cotton protected area of the Raichur District. In 1941-42, *Jayawant* occupied an area of 187,000 acres in the State.

BARODA STATE.

The total area under cotton in the State in 1941-42 was 882,000 acres; improved varieties occupied 252,000 acres or 29%. The position of improved varieties in the different tracts is indicated below :—

Surti tract (258,000 acres).—Surti cotton is grown in the Navsari District of the State. The improved strain being extended in this tract is 1027 A. L. F. which covered an area of 210,000 acres in the Navsari District in 1941-42.

Broach tract (403,000 acres).—The cotton crop of Baroda District is classified under Broach. The improved strain of this tract is B. D. 8, which is extending particularly in Dabhoi, Sankheda, Karjan and Sinor Talukas of the Baroda District, where wilt predominates. The area under it during the year was 13,000 acres.

In large areas of Waghodia and Savli Talukas where damage by wilt is not noticeable, B. 9, an improved type, is in keen demand. It is distinctly superior to the local Goghari and the Agricultural Department had a controlled area of 21,000 acres under it in 1941-42.

Dholleras (221,000 acres).—Mehsana and Amreli Districts of the State are included in this tract. In the Mehsana District, the improved strain *Wagad* 8, originally evolved by the Bombay Agricultural Department by selection in *Wagad* cotton is proposed to be extended. 3,000 acres were under this cotton during the year. In the Amreli District, pending further breeding work, C. 520 the improved *Bengals* type grown in the United Provinces, is proposed to be extended. The area under it was 5,000 acres.

RAJPIPLA STATE.

The total area under cotton in the State during 1941-42 was 164,000 acres, the whole of which was sown with 1027 A. L. F. The import and sowing of *Goghari* or any other short staple cotton are prohibited under the Rajpipla Cotton Improvement Act of 1921. Pure seed of 1027 A. L. F., for distribution to the cultivators, is obtained by the State every year from the Cotton Superintendent, Surat.

CHAPTER IV.

IMPROVEMENTS IN COTTON MARKETING, LEGISLATION AND OTHER PROTECTIVE MEASURES.

In addition to the production of better cottons, the Committee has, from its inception, devoted special attention to better marketing (in the widest sense of the word). An investigation into the financing and marketing of cultivators' cotton conducted by the Committee established beyond doubt that, in those tracts where regulated markets exist, the cultivators obtain better prices for their cotton and accordingly a recommendation was made to Provincial Governments to take steps for the establishment of such markets. As a result, legislation for the establishment of regulated markets has been enacted in the Provinces of Bombay, Madras, the Punjab and the Central Provinces, and the Hyderabad, Baroda, Indore and Sangli States.

In connection with the adoption of a definite cotton policy in Gujerat, the view was expressed that the crux of the whole problem centered round the better marketing of cotton and it was accordingly suggested that the Agricultural Produce (Grading and Marking) Act should be utilised to enable 1027 A. L. F. cotton to be marketed as a special grade of Surat cotton. As a result of the Committee's recommendation, 1027 A. L. F. grown in certain tracts in Gujerat (Bombay Province) was marketed under a special AGMARK during the last two years. The system of "Agmarking" based on field inspection and issue of certificates of purity to cultivators was, however, not found to be effective, as the premia obtained for "agmarked" cotton was not greater than that obtained for the same cotton when not guaranteed by "Agmark." This might possibly have been due to the abnormal conditions which prevailed in the cotton markets of Gujerat during the past two seasons and to the increasing unpopularity of the low ginning 1027 A. L. F. variety.

Although, as stated in the last year's report, the Rules under the Agricultural Produce (Grading and Marking) Act have been made applicable to 289F/1 (Sind-*Sudhar*), the AGMARK scheme has not been put into operation, as the major portion of the crop has not reached the standard of purity required. In regard to *V. 434* cotton, the grade specifications are being given another year's trial before the system of "AGMARKING" is introduced. The

Government of Madras have also had under consideration the application of the Rules under the Agricultural Produce (Grading and Marking) Act to Co.2 cotton in the Coimbatore District, but owing to the difficulty of grading this cotton on the basis of quality factors, such as length, colour, strength, cleanliness, etc., and the fact that almost the entire quantity of this cotton is readily purchased on the spot by the local mills, the adoption of the "AGMARK" system is not considered necessary.

Universal Standards were prepared during the year for the following varieties of cotton :—

1. *Oomras*,
2. *Broach*,
3. *Kumptas*,
4. *Dholleras*.

Owing to the lateness of the crop, standards for *Mathios* were not prepared. At the suggestion of the Karachi Cotton Association, the preparation of standards for Bengals, Sind, Punjab-American (Roller and Saw ginned), and Sind-American (Roller and Saw ginned) has been postponed till after the war.

In view of the present abnormal conditions, it was decided not to put into operation, until the return of normal times, the two cotton marketing survey schemes recently sanctioned by the Committee, one for the Madras Province and the other for Gujerat, the adjoining Agencies and States of Kathiawar and South Rajputana.

It was brought to the notice of the Committee that mixing of old cotton (lint) with new crop was being resorted to on a large scale in Berar during the 1941-42 season. In view of the desirability of checking the malpractice before it became widespread, the Committee decided to recommend that in those provinces where the malpractice of mixing old with new crop exists, it should be laid down that the press-owner who knowingly mixes old crop with new cotton or the owner of cotton who gets the mixture pressed, should be made liable unless, when old or a mixture of old and new crops is pressed, an additional mark "old" is put on the bale. During the year it was reported that in Khandesh a considerable amount of mixing of *Jarila* with inferior types was going on in the areas outside departmental control and that there was the danger that large quantities of mixed cotton might go into the market and depress the prices. To meet this situation, the Government of Bombay issued a notification in July 1942, making the mixing of *Jarila* with inferior cotton a penal offence.

In view of the transport difficulties, the Government of Bombay convened a conference, at which the Committee was represented, to examine the possibilities of revising the Cotton Hedge Contracts. At this conference it was decided that the Hedge Contracts Sub-Committee of the East India Cotton Association should devise a new system of contract in the light of the existing conditions. Subsequently, the report of the Hedge Contracts Sub-Committee was considered by the Committee and its main recommendations approved as being the best alternative under the existing circumstances. With regard to the varieties tenderable against the new Indian Cotton Contract recommended by the Hedge Contracts Sub-Committee, the Committee suggested the inclusion of Hyderabad *Gaorani* in addition to *Gaorani 6*, *Kumpta*, Upland and Westerns and also Cambodia and Tinnevellies which, in the opinion of the Committee, more than satisfied the requirements of the new Contract. The minimum staple length of $\frac{3}{4}$" prescribed for Fine *Jarila* was, however, considered by the Committee to be too low and the fear was expressed that this might possibly lead to mixing. The consensus of opinion was that 13/16" would have been a more correct estimate of the average staple length of *Jarila*. The Committee also recommended that trading in new crop should begin from 1st March. The recommendations of the Committee regarding the inclusion of Hyderabad *Gaorani*, Cambodia and *Karungannies* in the list of tenderable varieties were accepted.

In January 1940, the position arising from the reported shortage of cotton baling hoops was examined by the Committee and as no substitute was thought likely to effectively take the place of steel hoops, it was decided to draw the attention of the Government of India to the extreme urgency of taking immediate measures for maintaining an adequate supply of this material by arranging the import annually of some 16,000 tons of steel hoops for the specific purpose of baling cotton. In July 1942, the Committee was informed that orders had been placed by Government on America, under Lease/Lend, for 8,000 tons and 5,000 tons of baling hoops for the first and second half of 1942, respectively, apart from some 2,266 tons ordered on behalf of individual indentors. While noting this with satisfaction, the Committee reiterated its view that in order to ensure that there would be no profiteering and no discrimination in the allocation of the material to *bona fide* consumers, the work of distribution should be entrusted to the Indian Central Cotton Committee. It was pointed out that the object of the Committee in offering itself to undertake this work was to ensure expeditious and equitable distribution of the material so that the normal marketing

of the crop may not be hampered. The Government of India accepted the principle of the proposal and agreed that the distribution of hoops arriving under Lease/Lend should be made in accordance with the recommendations of the Indian Central Cotton Committee. In consultation with the Deputy Steel Import Controller, a scheme of distribution was drawn up and put into operation in the middle of August. At the same time, having regard to the position of supply of hoops in the country, it was decided that all cotton baling hoops arriving in India on account of orders placed under Lease/Lend by the Steel Import Controller, whether against Government stocks or private indentors, should be taken over under the Iron and Steel (Control of Distribution) Order, 1941, and distributed to actual users according to plan. A Sub-Committee was appointed to assist the Secretary in dealing with matters connected with the distribution of hoops. A questionnaire was sent out to all pressing factories in the country and, at the same time, the Provincial and State authorities were requested to furnish the pressings of individual factories during each of the past three seasons. At the same time, in order to exercise as complete a control as possible over the supply of hoops to pressing factories, an arrangement has been arrived at with the Iron and Steel Controller, Calcutta, whereby releases to factories from stocks held by the trade in the country are made by the Iron and Steel Controller only after consultation with the Secretary of the Committee. Applications for purchase of hoops from local stockists are also received direct in the Secretary's office and, after verification regarding the genuineness of the demand, necessary recommendations for acquirement and transport of the material are made to the Iron and Steel Controller. The object of this arrangement is to ensure that no pressing factory is put in a position to hoard stocks.

In order to check the spread of undesirable or inferior types of cotton and insect pests and diseases and other malpractices, several legislative measures have been passed by the Central and Provincial Governments on the recommendation of the Indian Central Cotton Committee. These are dealt with below :—

(i) **Cotton Transport Act.**—A brief account of the working of this Act is contained in the previous year's report and no important changes have since taken place. The Sangli State issued a Notification dring the year prohibiting the import into the State of cotton from outside the Kumpta-Dharwar protected area.

(ii) **Cotton Ginning and Pressing Factories Act.**—The Cotton Ginning and Pressing Factories Act, 1925, applies to the whole of British India, and practically all cotton growing Indian States have passed similar legislation or enforced the main provisions of the Act. A brief review of the working of this Act is contained in the previous year's report and only important changes that have taken place during the year under report are dealt with below :—

Rules 8 and 10 of the Cotton Ginning and Pressing Factories Rules, 1941, under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, were amended by the Sind Government during the year, by which the Buyers' and Shippers' Chamber, Karachi, were appointed as one of the authorities (with the Karachi Cotton Association and the Karachi Indian Merchants' Association) to issue reports on moisture content of cotton and to examine cotton, etc., at the request of the Director of Agriculture.

In order to relieve to some extent the difficulties arising from the shortage of hoops, the Committee recommended that old and riveted hoops should be allowed to be re-used provided the press marks on them were obliterated so as to make them indecipherable. In this connection it was pointed out that it was practically impossible to remove the old marks or to make them indecipherable without weakening the strength of the hoops and rendering them unfit for baling purposes. The Government of India were accordingly addressed to amend Rule 7 of the Cotton Ginning and Pressing Factories Rules, 1925, to provide that in cases where a bale is bound with old or riveted hoops bearing old press marks, the special mark allotted to the press and the serial number should be stencilled on the hessian only.

It was reported last year that the Government of India had been requested to amend Section 9 (1) of the Cotton Ginning and Pressing Factories Act, 1925, with a view to withdrawing the exemption granted to small factories under the proviso to this Section as it was being taken advantage of by some ginowners in the Central Provinces and Berar. The Government of India replied to say that as such complaints had not been received from any of the other cotton growing provinces, they were not satisfied that a case had been made out for the amendment of Section 9 (1) of the Act by Central Legislation. The views of the other cotton growing provinces and the East India Cotton Association were subsequently obtained and placed before the Committee which decided that, as the malpractice was reported to be prevalent

in the Central Provinces and Berar, there was no reason why the Central Provinces Government should not go ahead with legislation for the deletion of the provisos to Section 9(1) and 9(1A) of the Cotton Ginning and Pressing Factories Act, 1925, in its application to the Province, instead of waiting for the other provinces to agree to the proposal. The Provincial Government were addressed accordingly.

Out of 70 Indian States which have enforced in their territories the main provisions of the Cotton Ginning and Pressing Factories Act as applied to British India, by legislation or executive orders, weekly returns of cotton pressed were received from 60 ; in the remaining 10 States, pressing factories did not work during the year.

(iii) Prevention of introduction of Foreign Cotton Pests.—In order to prevent the introduction into India of the Mexican Boll-weevil (*Anthonomus grandis*) with imported American cotton, at the instance of the Committee, regulations have been imposed by the Government of India under which the import of American cotton into India is prohibited except through the port of Bombay where it must be fumigated with hydrocyanic acid gas before entry into the country. The work of fumigation is carried out under the technical supervision of the Secretary, and the cost involved is met by the levy of a small fee from importers on each bale of American cotton fumigated. Owing to the restrictions necessitated by the war, there were no imports of American cotton during the year under review, while 1930 bales were imported in the preceding year.

The Red (Sudan) Bollworm (Diparopsis castanea) and other pests.—The restriction on the import of foreign *kapas* (unginned cotton) and of foreign cotton seed remained in force throughout the year. 40 parcels of foreign cotton seed were received during the year, examined and fumigated, where necessary.

(iv) The Cotton Control Acts.—Cotton Control Acts are in operation in the Provinces of Madras, Bombay and the Central Provinces and in the Baroda and Bhopal States. The aims and objects of these Acts in the areas where they are in force are stated in last year's report. In so far as the Madras Province is concerned, it is reported that no breach of the Act was committed in the Coimbatore, Madura and Ramnad districts. In the Tinnevelly district, 293 suspected samples were seized, of which 80 were certified

to contain *Pulichai*. Prosecutions were launched against the owners, 74 of whom were convicted; six cases are pending. The fines levied amount to Rs. 272.

In Bombay, a few petty merchants in Ankleshwar area, dealing in *Goghari* cotton were traced and prosecuted and fines imposed. The spread of Selection 1A in preference to 1027 A. L. F., in parts of Surat district where *Goghari* was formerly grown is still going on, mostly in Bardoli and Jalalpur Talukas, on account of higher ginning percentage of the former and unremunerative premium for the latter. The new Segregate 8-1, which is nearly as good as 1027 A. L. F. in staple and as Selection 1-A in ginning, is likely to replace both. This is expected to solve the problem of the tract. As stated in last year's report, the Provincial Government have drafted a Bill to replace the existing Bombay Cotton Control Act to prohibit the cultivation and handling of any specified type or types of cotton, the spread of which they may desire to restrict.

On account of the mixing of inferior cotton with superior types in the Southern Maharatta Country, a draft notification has been published by Government with a view to applying the Act to the tract in question.

In Baroda State, the Act worked very effectively during the year. There were fourteen cases of infringement, nine of which resulted in conviction. The remaining cases are pending.

The Government of the United Provinces have decided not to put into force the United Provinces Cotton Pest Control Act.

CHAPTER V.

RESEARCH

Research into cotton problems of all-India importance is perhaps the most important function of the Committee. A number of research schemes among which the most important are those for cotton breeding for the improvement of quality, are in operation in the various cotton growing Provinces and States. The majority of these schemes are financed entirely by the Committee, while the cost of others is borne partly by the Committee and partly by the Provincial Government or State concerned. Research on cotton technology is carried on at the Committee's Technological Laboratory. In addition, trained Technological Assistants are posted at the Cotton Research Stations at Lyallpur, Mirpurkhas, Cawnpore, Surat, Dharwar, Coimbatore, and Parbhani, to help the botanists in charge in their work of breeding improved varieties of cotton.

RESEARCH ON COTTON TECHNOLOGY.

Research on cotton technology and the testing of cotton fibres, yarns and cloth are carried on at the Committee's Technological Laboratory. A brief summary of the work done during the year is given below ; full details are given in the Annual Report of the Laboratory which is now issued as a separate publication.

The total number of samples tested at the Laboratory during the period under review was 2,100 against 1,800 last year. The samples tested are dealt with in spinning, fibre test, yarn test and cloth test reports, which are issued on these samples. The number of such reports issued during the year was 1,208 against 1,046 in the previous year. Among the tests made on agricultural samples were those of *Jarila* cotton, grown in different localities in Khandesh, samples of *Jayawant*, New *Jayawant* and Early *Jayawant* to ascertain their relative suitability for the Dharwar tract ; samples of long staple cottons under trial in the Mysore State ; samples grown in mixed cultivation at Indore. In addition tests were made on a large number of representative trade samples, and the results of these tests were published for general information in the form of technological circulars and bulletins.

Samples received in the Testing House of the Laboratory from Government Departments, cotton mills and firms covered a very wide range showing the useful function fulfilled by the Laboratory in this respect and its growing appreciation by the interests concerned. These included a large variety of materials for the use of the Army, the Navy, the Air Force and the War Hospitals. An improved type of Quartz micro-balance has been designed which gives more consistent readings than a torsion balance. Several mills and firms referred their difficulties in the manufacturing processes to the Laboratory and these were successfully tackled. These included, among others, the causes for tendering of cloth, methods for removing stains in cloth, causes responsible for coloured spots in cheeses of cotton cord, relationship of mercerisation to fibre-properties.

In addition to these tests, a number of technological investigations are in progress and some of them were completed during the year. The first series of experiments on the precleaning and ginning of Indian seed cottons on different machines and with different speeds and settings was completed. The investigation on the effect of different speeds of beater and fan in the Crighton opener was pushed a stage further and a short note giving the tentative conclusions was published. Among the experiments in pogress, mention may be made of the effect of employing different weights, speeds and roller settings in the draw-frame, prediction of spinning value from fibre-properties of Indian cottons, efficiency of Kier boil and bleach treatments, alternative uses for short staple Indian cottons, study of relationships between wax content, feel and fibre-weight per inch of Indian cottons, determination of the constants for finding the standard hair weight of Indian cottons, etc. In addition, the work on Indian linters was also continued and for purposes of comparison standard grades of American linters were analysed. A brochure on Technological Research on cotton in India giving a connected account of the work done at the Laboratory between 1924 and 1941 was published.

Among the other activities of the Laboratory, mention may be made of the experiments for determining the alfa-cellulose content of Indian raw materials which are being conducted for the Board of Scientific and Industrial Research. Tests are also being made on behalf of the Central Marketing Department of the Government of India on a large number of samples of Agmark cottons with a view to laying down criteria for quality.

FUNDAMENTAL RESEARCH.

Fundamental research on cotton is carried on at the Institute of Plant Industry, Indore, which was established with the object of providing a central research station for cotton in the black soil area of the Malwa Plateau. In April, 1940, the working of the Institute was re-organised, as a result of which fundamental research on genetics and plant breeding, physiology and field-plot technique is carried out under a special scheme—Cotton Genetics Research Scheme. An annual subsidy of Rs. 30,000 is, however, given to the Institute for work on other crops for the Member States, as well as for seed multiplication, distribution and demonstration and such agronomical and chemical investigations as might be considered necessary for the benefit of the States. The work of the Institute, *viz.*, varietal tests and seed multiplication, followed the lines of the previous years. A detailed account of this work is published separately in the Annual Report of the Institute. A review of the progress made during the year under the Cotton Genetics Research Scheme is given below :—

Genetics of lintless genes.—The study of the inter-relationships among the genes responsible for lintlessness in Asiatic cottons and the linkage relationships of these lintless genes to other known genes was continued during the year. F_2 populations of several crosses were under observation and the analysis of the results has revealed that the two genes *lia* and *lic* are independent of each other and that while both of them inhibit lint production, *lic* is epistatic to *lia*. The gene *lic* was found to slow down the growth of the plant carrying it and the gene *lia* to assort independently of the petal colour (*Y*) and anthocyanin (R_2) genes. Indication as to the independent assortment of *lib* gene with anthocyanin, flower colour and leaf shape genes was also obtained. The study of the cross, Punjab hairy lintless (*lic*) x Punjab glabrous lintless (*hb*), showed that the *lic* gene, which is independent of *lia* and *lib*, is independent of *hb* also. A germination test, intended to collect evidence on the effect of environment on the viability of the seed carrying *lic* gene, was conducted with linted and lintless (*Lic* and *lic*) seeds under different temperatures—26°C. (room temperature) and 30, 40 and 50°C. It was observed that while the percentage germination decreased with increasing temperature, there was no evidence of differential effect of the temperatures on the two types, but the mean germination percentage, however, of lintless seed (42.7) was significantly less than that of linted seed (62.3).

Anthocyanin genetics.—During the year progenies of certain aberrant plants that had occurred in the various F_2s and backcross families and whose behaviour could not be explained were followed up. It was clear from the observations that the aberrant plants arose by mutation of the alleles of the R_2 series; in one case it was a mutation in F_1 gametes of R_2^{OS} to R_2^{AS}. In another case, the mutation was from R_2^{GS} to R_2^{AS}; in a third case, a mutation had occurred from R_2^{WO} to "green spotless." The behaviour of this "green spotless" isolated at Indore would appear to differ from the green spotless R_2^{FO} described by Silow and which has some pigment in the exposed petal margins.

Single leaf mutant.—Further results about the single leaf mutant mentioned in last year's report have been obtained. One of the F_2s of the cross between the mutant and Malvi 9 (Broad leaf) gave 45 broads to 11 mutants suggesting a single factor difference. Of the segregating families only two approached a 3 : 1 ratio. In all other families the mutant types were much fewer than the expected one-fourth and the ratio between broad and mutant varied very widely with an average of 9.95 : 1. From a fresh batch of selfed seed of the F_2 plants an analysis of the embryos was made to see if any abnormal or undeveloped seeds appeared with regularity. The study, however, showed that the abnormal ratios did not arise from the production of undeveloped embryos.

Petaloidy genetics.—Seed of the petaloid mutant isolated in Coimbatore was obtained and crossed with N. 6 and Narrow *Kokati* to determine the linkage relationships of the mutant. In the cross with N. 6 the expression of petaloidy was very variable and by the test of independence, no linkage is evident between petaloidy and petal colour. Segregation for anthocyanin pigment also proved the independent assortment of petaloidy gene and anthocyanin genes. The absence of linkage was also established by a small number of backcrosses of the F_1 to the parents.

In the other cross, the F_1s backcrossed to Narrow *Kokati* gave all normal flowers showing complete dominance of normal over petaloidy. The behaviour of the petaloid gene differently in the two crosses would indicate that its dominance relationship varies according to the background.

X-ray work.—It was reported previously that by X-raying seed of M.U.4, an Upland strain, there was an increase in ginning percentage and that this increase due to X-raying had proved significant in all the three years

of trial, 1938-39 to 1940-41. In all these years, it was the treated bulks for 10 minutes and 20 minutes that were compared against the untreated control in a replicated experiment. Since there was the possibility of the M.U.4 strain itself being variable for ginning percentage, the experiment was modified during the year and instead of growing the bulks, 10 progenies (single plants) taken from each of the treatments, A (Control), B (X-rayed 10 mins.) and C (X-rayed 20 mins.), were grown in replicated family blocks. The effect of X-ray treatment (it is X-4th generation now) was still significant, although the increase due to treatment was very much less than in the previous years where the average increase due to the treatment was about 3%. Attempts are being made to have the X-ray treatment repeated.

Wilt work.—The incidence of wilt was low in the experimental area during the year, probably owing to general shortage of rain. As in the previous year, four strains, two included in the last year's trial and two promising selections from the plant breeding section, were tested in replicated plots in the wilt-sick field. Only one family H. 52, which was found homozygous last year, again proved to be so in pot and field tests, whereas the other three strains, K. 76, F. 2 and F. 18, were homozygous in the field test only.

The genetics of wilt resistance was studied in the F_2s of three crosses, *viz.*, Malvi 9 x New Million Dollar *Jarila* x New Million Dollar and Malvi 9 x *Jarila* and their reciprocals. The progenies were grown in a replicated experiment in an artificially wilt-infected field. The mortality data showed that the three families are not homogenous, *i.e.*, the type of segregation was different in each of them. The behaviour of *Jarila* x New Million Dollar was different from the other two crosses. In this, the field immune group (grade (1)) formed 28.8% and the susceptible group (grades 3-5) 16.5% of the total, *i.e.*, a higher proportion of immunes and a lower proportion of susceptibles than in the other two crosses. From the figures of resistant and susceptible plants obtained in the F_2s of the crosses, Malvi 9 x New Million Dollar and Malvi 9 x *Jarila*, the ratios may be interpreted as 3 : 1, as the deviations from this ratio are not significant in either family. Further discussion, however, of the ratios will have to await next year's results, as the basis of interpreting the ratios varies with each cross.

Cytology.—Hybridization was concentrated on three wild species, namely *G. Thurberi*, *G. Harknesii* and *G. Raimondii*. *G. Thurberi* crossed freely both with *arboreum* and *hirsutum*, but while some of the seeds did not have the embryos in the crosses with the former, in the cross with *hirsutum* all

the seeds have well developed embryos. A successful cross between *G. arboreum* and G. *Raimondii* was obtained for the first time. The use of colchicine for doubling chromosomes was continued in six or seven crosses and so far bolls have set only in two crosses G. *taitense* x G. *hirsutum* and G. *armourianum* x G. *hirsutum*.

Physiology.—The experiment designed to study the competition effects between *desi* and selected Uplands (*viz.*, M.9, M.U. 4, Indore 1., Buri 107 and x 4463) in a mixed crop was repeated for the last time. It was observed that unlike last year Malvi 9 was significantly the lowest in stand and that pure Uplands plots of Buri 107 and Indore 1 as well as their mixtures with Malvi 9 had given significantly higher stands than the rest. In yield of seed cotton M. 9 was significantly the highest of all; among the pure Uplands, Indore 1 was significantly better than the other three. Comparing the yeilds of the mixtures against the average of the constituents, the mixture of Malvi 9 and M.U.4 was significantly higher than the components. The effect of competition appeared to be in favour of Malvi 9 in the case of mixtures with M.U.4 and x 4463 and in favour of Indore 1 and Buri 107 in the case of the other two. The results of the technological examination showed that among the four Upland strains, both Buri 107 and x 4463 are nearly alike in having high fibre length and low fibre weight, but it was only the latter when mixed with Malvi 9 that gave a higher spinning value. It seems evident that apart from fibre length and fibre weight, certain cottons have got some special characteristics to make them most suitable for mixing. As the experiment has now been closed, the results will be written up.

COTTON RESEARCH IN PROVINCES AND STATES.

BOMBAY.

(a) **Broach Cotton Breeding Scheme.**—The Cotton Breeding Scheme at Broach has been in operation since April, 1932. The original object of this scheme was to obtain, by selection or hybridization, suitable types of cotton possessing wilt-resistant, high yielding, high ginning and superior spinning qualities, to replace the local mixture, a large proportion of which consisted of *Goghari*, a short staple, high ginning (40%) variety. In view, however, of the Committee's policy to replace, wherever possible, short staple with medium and long staple cottons, attention is now being concentrated on wilt resistance, high yield and fibre length.

The breeding of wilt-resistant types originally formed part of the Broach Breeding Scheme, but as it was considered desirable that this work should be done under optimum conditions of wilt infection, and as the required conditions, especially soil temperature in pots, were difficult to maintain at Broach, this part of the work was transferred to Poona in June 1935, together with similar work on cottons for the Jalgaon tract.

During the year under report, Segregates, 76-1, 1-2, 1-6, 5-18, 7-29 and 3-1, were tested in wilt-free soil on the farm against B. D. 8 and Broach local for yield. The results showed that though all of them were as good as B. D. 8 in respect of yield, they were significantly poorer than the local. All the segregates maintained their high ginning percentage of 42-44 against 35% and 43% of B. D. 8 and Broach local, respectively. Their lint yields per acre were significantly higher by 27-37% than that of the quality strain B. D. 8, but 10 to 16% less than that of the Broach local. In the wilt-sick plot, the local was more affected than either B. D. 8 or the segregates.

Village trials were carried out with segregates, 1-2 and 1-6, B. D. 8 and Broach local, in four centres, 3 in black soil and 1 in *gorat* soil, of the Broach district. The yield of Segregate 1-2 was found to be on a par with B. D. 8 and Broach local at Kelod, a black soil centre; at Nabipur, another centre in black soil, both the segregates yielded as well as B. D. 8. The results at the remaining centres were not significant. The ginning outturn of the segregates was higher than that of B. D. 8 at all the centres and equal to that of the local at Nabipur and Kelod. The spinning test results indicated that both the segregates, 1-2 and 1-6, are superior to Broach local in spinning value, being adjudged suitable for 41's and 45's highest standard warp counts, against 13's of the local. On the basis of mill valuations, it is stated that the segregates realised Rs. 7 more per acre than B. D. 8 and Rs. 20 more than Broach local. In respect of acre cash values, the new strains—1-2 and 1-6—fetched in 1940-41 Rs. 11 and Rs. 13 more than B. D. 8, but Rs. 7 and Rs. 9 less than the local, respectively. Broach local is reported, however, to have given abnormally high yield of seed cotton during the season in question.

To obtain further improvement in fibre length and feel, the segregates, 1-2, 1-6 and 5-18, have been crossed with 1027 A. L. F.

Under the wilt-breeding part of this scheme, the object is to evolve a cent per cent wilt-resistant type from the material available at Broach. The

testing, during the year, for 100 per cent wilt resistance in pot culture at Poona was confined to the most promising segregates, 76-1, 1-2, 1-6, 5-18, 7-29 and 3-1. With the exception of 76-1, all the segregates showed a high degree of wilt resistance.

The study of the F_3 of the cross (K. F x 1027 A. L.F) and the back cross (K. F. x 1027 A. L. F.) x K. *F.* has confirmed that resistance to wilt in G. *herbaceum* is due to a single factor.

(b) Jalgaon Cotton Breeding Scheme—This scheme has been in operation since April 1932. Its original object was to obtain, by selection or hybridization, suitable wilt-resistant types with heavy yielding, high ginning and good spinning qualities, to replace the local mixture of N.R. and *Banilla* cottons in Khandesh. Wilt breeding work was originally included in the Broach and Jalgaon Cotton Breeding Schemes, but, in August 1936, it was decided that the wilt work should be treated as a separate scheme from the 1st April, 1937. In July 1941, the wilt-breeding scheme was extended up to 31st March, 1947.

During the year under review 18 cultures of *Docras* cotton were tested against *Jarila* ; of these 15 failed, while the remaining three were on a par with *Jarila* in respect of yield but superior to it in ginning outturn by 1 to 3% and in staple length by 0.1 to 2 mm. The behaviour of these three promising cultures in the wilt plot indicated a gradual building up of resistance in all their sub-cultures except three which showed high mortality.

Segregates from the following crosses were under observation :—

(1) [(*Jarila* x N.R. 5) x New Million Dollar] F_3.

(2) (*Jarila* x N.R. 5) F_4.

(3) [(*Jarila* x New Million Dollar) x Jarila] F_2.

All the cultures, except one from the first cross, proved to be undesirable in all respects ; out of four cultures from the second cross tested in a replicated trial, only one did not give any significant yield. All these cultures, however, were superior to *Jarila* in respect of ginning percentage and equal to it as regards lint length. Twenty-two plants with high ginning percentage and staple length have been selected from the third cross for further study. A new cross has been made during the year, between *Jarila* and N. R. 5 and the F_1 is proposed to be backcrossed to *Jarila* to combine the staple of *Jarila* with the high yield and ginning of N. R. 5.

Village trials, undertaken in 33 centres of Khandesh, with *Jarila* and local, did not reveal any significant differences in yield.

Comparative yield trials of *Jarila*, *Banilla* and N.R. 6 were conducted on Jalgaon, Bhadgaon and Dhulia farms. At the former two places the yield of *Jarila* was equal to that of N. R. 6 but superior to that of *Banilla* while at the latter place N. R. 6 gave the highest yield ; between *Jarila* and *Banilla*, however, there was no difference in respect of yield. *Jarila* was valued at Rs. 90 to Rs. 110 ' on ' Broach per candy of 784 lbs. by the Mill-owners' Associations of Bombay and Ahmedabad.

Under the wilt-breeding part of this scheme, progenies of 14 plants of two cultures of *Jarila* were tested in pot culture. All the cultures showed a high degree of mortality ; the tests will be continued.

(c) **Scheme for breeding wilt-resistant cottons in Surat area.**—This scheme was sanctioned by the Committee in August 1936 and commenced work in April 1937. The object of the scheme is to obtain a strain of cotton completely resistant to wilt and suited to the natural conditions obtaining in the Surat tract. This is sought to be achieved either by selection in 1027 A. L. F. or by crossing this cotton with B. D. 8 or other wilt-resistant strains.

During the year under report, the following crosses were tested in the wilt-sick plot at Shera :—

(1) [(B. D. 8 x 1 A. L. B.) x 1027 A. L. F.] F_8.

(2) (8-1 x B. D. 8) F_3.

(3) [8-1 (B. D. 8 x G. A. 26) x B. D. 8) F_6 1-6] F_3.

(4) [1027 (B. D. 8 x G. A. 26) x B. D. 8) F_6 1-6] F_3.

(5) (8-1 x 1027 A. L. F.) F_7.

As none of the plants of the first two crosses showed the desired combination of characters, it is proposed to discontinue further work on them. The remaining three crosses gave respectively 6, 11 and 2 families which are promising in respect of wilt resistance and other agricultural characters.

The wilt resistance of Segregate 8-1 was confirmed in field tests at Shera, but in the pot culture tests at Poona, it suffered a mortality of 93%. It is proposed to test it further at Poona in the ensuing season.

(d) Scheme for improvement of Wagad cotton at Viramgam and Jagudan— While examining the possibility of growing medium and long staple cottons in the short staple areas of India, the Committee, in August 1935, decided that, in view of the absence of any serious attempt to improve the cotton of the large *Dholleras* tract, a comparative study of Indian and Iranian *herbaceum* cottons should be undertaken, with the object of finding out one or more suitable types for the tract. A special officer was deputed to Iran to collect *herbaceum* types of cotton grown there and, in August 1936, a five-year scheme was sanctioned for the improvement of *Wagad* and *Mathio* cottons, the work on *Wagad* cottons being centred at Viramgam and that on *Mathio* at Amreli. The objects are the improvement of *Wagad* cottons for (*a*) quality and yield and (*b*) earliness in order to escape frost, and the replacement, if possible, of the inferior *Mathio* cotton of Kathiawar by early *herbaceum*. These are sought to be achieved by (*a*) selection in *Wagad* cotton, (*b*) hybridization with Surti-Broach quality cottons like 1027 A. L. F. and B. D. 8 and (*c*) hybridization with Iranian *herbaceums* known to be early and of better quality.

The whole of the Wagad area is divided into two main tracts: (*i*) the Viramgam tract, characterised by low rainfall and (*ii*) the Dholka tract with greater and more regular rainfall. The main breeding station is situated at Viramgam and simultaneously a small immune area is being maintained, under irrigation, at Jagudan to safeguard the work at Viramgam. In July 1941, it was decided to establish another sub-station at Dholka for conducting botanical work on the promising material obtained from Viramgam.

During the year under report, 29 families derived from the local *Wagad* and the hybrid population of crosses and back-crosses were tested in two randomised and replicated experiments. Families 293 and 72-2 were found to yield significantly better than *Wagad* 8 and 18 other families were on a par with it. The ginning percentage, however, of the two high yielding families was lower than that of the control, but it is stated that there is scope for further improvement in this character. Of the latter set of 18 families, eight were promising in respect of fibre characters and early maturity.

Three hundred and sixty-nine selections from the crosses of *Wagad* with Surti Broach, Iranian quality cottons and Russian *herbaceums* were grown in non-replicated progeny rows and forty-four families have been retained for further study. The study of a large number of plants of local *Wagad*

raised from the seed samples collected from Porbunder and Junagadh States is reported to have shown the limitations of the scope for effecting further improvement over the standard *Wagad* type—*Wagad* 8. Seg. 4-1, a derivative of the back-cross—(W. 8 x 1027 A. L. F.) F_1 x W. 8—which was included in the village trials along with local *Wagad* and *Wagad* 8 for six seasons in Viramgam taluka where the vagaries of the season are great, however, gave on an average 8% more *kalas* (dry bolls with seed cotton), 7% more seed cotton, 21% more lint and 5.6% higher ginning percentage than the local *Wagad*. It has also been found to do well in years of favourable rainfall and fetches a premium of Rs. 5 to Rs. 15 over *Wagad* 8. It is accordingly considered to be a profitable type for general cultivation.

As a result of large scale variety trials carried out in the past, an open-boll type, Seg. 7-1, derived from the cross W. 8 x 1027 A. L. F., has been found to be promising in the Lalio tract of Mehsana *Prant*. It is superior to Chokadia Broach 9 and Broach local in respect of lint yield and ginning outturn and approaches 1027 A. L. F. of Surat in spinning value. Village trials of this type are proposed to be carried out in 1942-43 in Lalio tract of Ahmedabad District.

(e) **Scheme for improvement of cotton crop in Kaira District.**—This scheme was sanctioned by the Committee in August 1939, subject to the condition that it would not come into operation until the Government of Bombay had declared Kaira district as a protected area under the Cotton Transport Act to prevent the import of inferior cotton from Nandurbar. In April 1941, the Government of Bombay issued a notificaton creating the Mahi-Sabarmati Zone (which includes the whole of the Kaira district) a protected area under the Cotton Transport Act, 1923 ; the scheme came into operation in September 1941.

Kaira district grows two kinds of cotton, (1) *G. herbaceum* var *frutescens*, popularly known as *Kanmi* and (2) *G. arboreum* var *typicum* known as *Rozi*. The former is an annual cotton of superior type and is generally grown in black soil, whilst the latter, which is found as a subordinate crop with cereals in *goradu* soils, is a perennial type, with short coarse staple and 25 to 26% ginning outturn. The area grown under these two cottons is, on an average, 78,000 acres, that under *Rozi* being 10,000 acres. Though the bulk of the cotton grown is the better *Kanmi* quality, its reputation has, of late, been spoiled by the admixture of *Rozi* cotton in the gins. The object of the

scheme is to find a superior type of cotton by selection or by the introduction and trial of other perennial or annual cottons, to replace the *Rozi* type on the *goradu* soils of the Kaira district.

During the year under review, the progeny of *Rozi* cotton seed samples collected from representative villages of 9 different talukas in the tract were examined and 55 plants with ginning percentage of 20.7—37.2 and staple length of 17.1—23.4 mm. were retained for further study. The growth and bearing of the indigenous and exotic perennial varieties were not found to be impressive. Most of the American annual types also did not come up well.

The Broach segregates, *viz.*, 76-1, 1-2, 1-6, 5-18, 7-29, 3-1 and B. D. 8, were tested against the local *Kanmi* in a varietal trial. The lint yields per acre of segregates 1-2, 1-6, 5-18 and 7-29 were on a par with that of *Kanmi*, while those of 76-1, 3-1 and B. D.8 were statistically lower. An analysis of the cotton types grown in the district showed that *Kanmi* is composed of two main varieties, Broach *Desi* and *Goghari*, the proportion of *Goghari* being higher than Broach *Desi*; no distinct types were found in *Rozi*.

The examination of cotton plants undertaken during a survey of cotton diseases prevalent in the Kaira district showed that the majority of the plants of *Kanmi* variety were attacked by root rot while a few were also affected by wilt. Plants of *Rozi* variety did not, however, suffer from these diseases. Stenosis (small leaf) was observed both in *Rozi* and *Kanmi* cottons.

(f) **Scheme for interspecific hybridization in cottons at Surat.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years, with the object of obtaining, if possible, fully fertile hybrids between Asiatic and American cottons, combining the useful agronomic characters of both, particularly the good staple length of the American and hardiness and adaptability to Indian climate of the Asiatics. Work on crossing Asiatic and American cottons, begun at Surat in 1932, had already yielded 23 hybrids in which the American parents used were mostly the acclimatised Upland types from different parts of India, while the Asiatic parents were forms of *G. herbaceum* and *G. arboreum*. The hybrids produced from these were, however, sterile and efforts to induce fertility in them were successful only when they were back-crosssed to American types.

During the year under report, it is stated that 41 F_1 hybrids (Asiatic x American) and 46 first back-cross plants were under observation. The set

of back-cross plants is considered to be a permanent source of material for selection of stable types as 40 of them are more or less fertile and most of the plants contain 52 chromosomes. Fertility has been induced in the F_1 hybrids, which were all self-sterile, by back-crossing them to new world types; nearly 174,000 flowers were pollinated, and 91 bolls, having 128 seeds, have been obtained.

Colchicine having proved an effective chemical for restoring fertility was repeatedly tried on the F_1 hybrids. Out of the 15 hybrids thus treated, three showed the effect of the chemical and two set a number of bolls with many seeds. Back-crosses 22, 68, 125, 134 and 170 are stated to be valuable from the economic point of view. Some of the cultures obtained from these back-crosses were found to be superior in respect of lint length, ginning percentage and earliness. Attempts are being made to synthesise the desirable characters in one type by using these promising cultures as parents in crosses. It is reported that hybridization between a tetraploid and hexaploid and between a hexaploid and an octoploid showed that too much increase in the chromosome numbers adversely affects the normal growth process in the plant.

Cytological work has helped in explaining the causes of sterility met with in the several crosses and in judging the chromosomal balance of the fertile back-cross cultures.

SIND.

(a) Scheme for production of long staple cottons in Sind.—Ever since the opening of the Lloyd Barrage, the question of the establishment of a compact block of long staple cottons in Sind has engaged the attention of the Indian Central Cotton Committee. Although attempts in the introduction of long staple quality cottons in Sind, in the past, have not met with the success it was anticipated they would, the project, nevertheless, is considered to have possibilities which are well worth investigating. Accordingly, a five-year scheme for cotton-breeding investigations for the production of long staple cottons has been launched. The scheme came into operation in April 1940. The experimental stations are situated at Mirpurkhas and Oderolal. The most important problem to be tackled is to see whether high quality cottons, preferably of the American types, but possessing a better staple than Sind *Sudhar*, can be produced. The aim is to evolve a cotton longer than 1-1/16″ which would spin about 60 counts and give a high acre cash value of

kapas relative to the commercial cotton crops now being grown in Sind. This is sought to be achieved by selecting extra long staple Upland types from a wide range of places all over the world, and, after testing them under Sind conditions, hybridising the best of them with the hardiest upland types of cotton, such as, Sind *Sudhar* and M-4, now grown on a commercial scale in Sind.

During the year under report, the progenies of 144 selections from each of the two groups of cottons, *hirsutum* and *barbadense*, were examined for desirable combination of characters ; sixteen from the former and twenty-three from the latter have been retained for further study. The F_1 progenies of the crosses between each of the long staple Upland types imported from U.S.A. and the two local strains, Sind *Sudhar* and M-4, are reported to have shown no appreciable differences as regards staple length ; in respect of ginning outturn, however, the M-4 crosses were better than Sind *Sudhar* crosses. The F_1 population of the crosses between Sind *Sudhar* and the imported types was raised at Coimbatore during the period, October-April, 1940-41, and the F_2 generation was grown at Mirpurkhas during the year under review ; out of a population of 754 plants examined, 57 were found to possess a staple of 1-1/16″ and over. Twenty-two of these were obtained from the cross, Sind *Sudhar* x Wilds strain, and thirteen from Sind *Sudhar* x Express. All the crosses were appreciably superior to Sind *Sudhar* in respect of ginning percentage.

In the experiment, ridge *versus* flat sowing, the yield obtained from flat was significantly greater than that on the ridge, in spite of the stand on the flat being significantly poorer than on ridge. The result is contrary to that of last year and it is proposed to repeat the experiment in the ensuing season.

(b) Scheme for Cotton Jassid Investigation.—In Sind, jassid attack is most prevalent in the south-east Tharparkar district where it is proposed to establish a compact block of long staple cotton. One of the harmful effects of this pest is improper development of the seed, so that, in certain seasons, good seed is not available for sowing purposes, and this gives a setback to the extension of improved varieties. Accordingly, in August 1937, the Committee sanctioned the above scheme, for a period of three years and six months, with the object of studying the habits of jassids, their alternative hosts and the manner in which certain varieties of cottons resist jassid attack. In January

1941, the scheme was extended up to 18th April, 1945. The progress made during the period under review is described below :—

During the year under review, six varieties, *viz.*, Sind *Sudhar*, M-4, N.T. 38, 4F-98, L.S.S. and S.L.D. 1, were tested for their susceptibility to jassid attack. The measure of susceptibility in this study was the number of jassids attracted. Viewed in this light, 4F-98 and Sind *Sudhar* appear to be the most susceptible varieties, whilst S.L.D. 1 is highly resistant. An examination of the varieties and crosses raised in the Long Staple Cotton Scheme has indicated that Acala-8 is markedly susceptible and that amongst crosses those of M-4 are less susceptible than those of Sind *Sudhar*. Varietal differences in the degree of resistance are attributed to the inhibition to a greater or less extent of the oviposition of the insect. It is stated, however, that the density of jassid population attracted by a variety is not necessarily related to the amount of damage caused to it.

In the seasonal sowings, it was found that the May sown crop suffers more from pest attack than the March-April sown crop. The jassid population increases, irrespective of variety, by the beginning of July, reaches the climax in late July or early August and declines from mid-September. *Bhindi*, brinjal and potato are the important alternative host plants in Tharparkar district which help the pest to tide over the period intervening between two successive cotton seasons.

(c) **Scheme for co-ordination of Research on Black-headed Cricket in Sind and Baluchistan.**—The scheme for investigation into the black-headed cricket in Sind was sanctioned by the Committee in January 1938, for a period of three years, with the object of establishing the identity of the pest and studying its life history, seasonal behaviour and the extent of the damage caused by it. Before the opening of the Lloyd Barrage, the Black-headed Cricket had been known as an occasional pest of Sorghum and cotton in Upper Sind and some parts of the Punjab. With the introduction of cotton cultivation on the Right Bank of the Indus, however, this insect has become a serious pest of cotton in the seedling stage in Khirtar and Johi tracts in Sind and in some parts of Baluchistan. The pest appears in the cotton fields towards the end of April and disappears in June. The period of its activity synchronises with the sowing time of cottons and causes almost wholesale destruction of the crop. The pest appears to belong to the same species as met with in Baluchistan, *viz.*, *Gryllulus domesticus*. Since April 1941, the scheme has been merged in the scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan.

The objects of the co-ordinated scheme are (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures, and (3) to control and prevent the ravages of the pest by means of poison baits.

The Baluchistan part of the above scheme has been dealt with elsewhere.

During the year under report, the study, in Sind, of the life-history and seasonal behaviour of the cricket showed that it does not hibernate in any season. It is found throughout the year, being abundant from April to July. Baiting material was distributed to the infested cotton growing centres on the Indus Right Bank from three depots in the Larkhana district and from six depots in the Dadu district, and the efficacy of the poison bait was also demonstrated to the *zamindars* who were, at the same time, advised to dig a trench round their cotton fields and keep it filled with water. Flooding the fields and the surrounding trenches with water was advocated as a measure for driving out the pest.

It is reported that many *zamindars* availed of the help given by way of free supply of the baiting material and that the more enlightened unhesitatingly adopted the measures recommended.

(d) Scheme for bollworm investigation and clean-up campaign in Sind.— This scheme was sanctioned by the Committee in January 1940, for a period of 3½ years, and it came into operation on the 1st September, 1940. The work proposed to be carried out under the scheme during the first seven months was (*a*) to survey the host plants during the off-season of cotton and (*b*) to test the efficacy of the implements evolved elsewhere. During the remaining period, it is proposed to carry out a clean-up campaign and to study its effect on the succeeding year's crop. The investigations are confined to the Tharparkar district.

During the year under review, the incidence of the pest was studied from August to October in 19 different localities selected at random in Tharparkar district. As in the previous year, it was found that the bollworm attack on cotton in areas, where the rice crop preponderated, was on an average 29.8% ; in areas growing partly rice and partly cotton, the mean attack was 12.2% and in areas growing cotton mainly, the attack was comparatively mild, the average being 6.3%. The night caging experiments

conducted at four different centres are reported to have shown that the loss caused by the pest to Sind *Sudhar* in the mixed area was about twice as much as in the purely cotton area. Data from the centre in rice area, however, could not be gathered owing to severe damage to the night cage.

Large numbers of the larval parasite of the spotted boll-worm—*Microbracon lefroyi*—collected from the South-Eastern Punjab, were liberated in the cotton fields of Gammuri and Bodar farms in the Umerkote taluka and some also near Digri and Mirpurkhas. Observations showed that the percentage of parasitism in the first half of August was 55.2 at Gammuri and 21.6% in Bodar, but from the second fortnight, it gradually decreased, until in November it ranged from 5 to 20% at both places.

Seven thousand five hundred *kudalis* were distributed during the year in the selected area (87,478 acres) for the clean-up operations, *i.e.*, roughly one *kudali* for 12 acres. The removal of cotton stalks began in December-January and the campaign in 97.1% of the area was completed by the close of February ; 90.7% of the area was cleaned up by the use of *kudali* and the remaining by means of the indigenous hatchet. Further, the eradication of the important alternative host plants, *viz.*, *Patiteer* weed (*Abutilon indicum*), *Bhindi* and *Gulkhario* (*Althea rosea*) was also completed in the clean-up area. The effect of the wide campaign carried out, however, will not be known until about the end of the next cotton season.

PUNJAB.

(a) Punjab Botanical Scheme.—This is one of the earliest schemes of the Committee. Sanctioned in 1923, for a period of five years, it came into operation in August 1925, and has been extended from time to time, the last extension, which will expire on the 28th February, 1945, being approved by the Committee at its meeting held in January 1940. Until 31st March, 1936, the entire cost of the scheme was borne by the Committee, but since then, the expenditure is shared on a 50 : 50 basis between the Committee and the Provincial Government. The original object of the scheme was to investigate the causes of the periodic failures of American cotton in the Canal Colonies of the Punjab where a large area is annually grown under such cottons, and to obtain suitable types of American and *desi* cottons. In view, however, of the immediate economic importance of improved types of cotton, work was concentrated on breeding, and a separate physiological scheme was sanctioned for investigating the problem of periodic

failures of American cotton. The Botanical scheme has thus been concerned mainly with the improvement of both *desi* and American cottons. As more than half the cotton area in the Punjab lies in the Canal Colonies, attention was first directed to the improvement of the cottons of that area. The South-Western tract of the Province, comprising the arid districts of Multan, Muzaffargarh and Dera Ghazi Khan, were given attention next and a sub-station for this purpose was opened at Multan in 1935.

The improved Punjab-American strains, *viz.*, 289F/43, L.S.S., 289F/K.25, are now under large scale cultivation in different regions of the province. L. S. S. is said to preponderate in the districts of Lyallpur, Sheikhupura and Sargodha, 289F/43 in the south-western districts and parts of Lower Bar Doab Canal Colony, while 289F/K.25 is the chief variety in Multan and parts of Montgomery. Though these varieties are a great improvement over the original type 4F, each of them is still found to be defective in certain characters, *e.g.*, 289F/43 is a low ginner, L. S. S. is late maturing and 289F/K.25 is highly susceptible to jassid infestation; efforts are, therefore, being made to remedy these defects by re-selection in the respective varieties. It is stated that a few high ginning selections from 289F/43 are on hand and that jassid resistant types are being evolved from the cross between 289F/K. 25 and 289F/43.

Two new American types, 124F and 199F, evolved under the scheme are reported to deserve special mention. The former, which has been extensively tested, has proved to be one of the best cottons for cultivation in the south-western districts of the Punjab and the Lower Bari Doab Canal Colony. It combines an average lint length of 0.98″ and 34-35% ginning outturn with high yield. The second strain, 199F, is said to be a potentially better yielder than most of the present Punjab-American strains; it possesses, in addition to a staple length of 1″ and ginning percentage of 38-40, marked capacity to resist jassid attack.

The breeding of *desi* cottons, suitable for the different ecological regions, gave 39 Mollisoni, well established now over vast areas in the Colony districts, and 119 Sanguineum, suitable for the south-western tract. However, the recent general slump in prices of *desi* cottons has militated against the spread of these types. During the year, Jubilee gave, on the Military farms at Okara and Iqbalnagar, an average yield of 11.1 maunds and 10.7 maunds, respectively, against 10.0 and 9.9 maunds obtained from 39 Mollisoni.

Two new sub-stations, one at Jhang, for breeding American cottons, and the other at Hansi for work on *desi* cottons, have been started on 1st April, 1941. Work on the improvement of *Kapara* cotton was taken up at the Agricultural Farm, Ferozepur.

(b) Scheme for improvement of Punjab-American 289F/K. 25 cotton.—This scheme was sanctioned in January, 1938, for a period of five years and commenced work from the 9th July, 1938. The object of the scheme is the improvement of 289F/K.25 cotton which was evolved at the B. C. G. A. Farm some years ago. Though this strain is very popular in the Lower Bari Doab Canal Colony and the area under it has expanded very rapidly, it suffers from the defect of susceptibility to jassid attack. One of the aims of the present scheme, therefore, is to develop jassid-resistant strains from this cotton.

During the year under review, owing to low incidence of jassid attack at Khanewal, it was not possible to judge precisely the purity of the hybrid progenies for jassid resistance. The purity of these progenies in respect of halo length and ginning outturn also could not be established as, owing to heavy *tirak* attack, only a few well opened bolls were obtained. Several progenies evolved from the back cross, (289F/K. 25 x 289F/43) x 289F/K. 25, are, however, said to be promising as regards jassid resistance. Efforts are being made to breed jassid-resistant strains possessing similar lint length and ginning out-turn as 289F/K. 25 from the following crosses also :—

1. (4F (Sakrand) x 124F) x 4F,
2. (920 Cambodia x 58F) x 124F,
3. (920 Cambodia x 58F) x 289F/43,
4. 124F x L.S.S.,
5. 124F x 289F/K. 25.
6. Co.2 x Sind *Sudhar*.

It is stated that mass selection adopted on the British Cotton Growing Association Farm with a view to eliminating plants with low ginning percentage and plant habit differing from the normal has substantially increased the ginning outturn and homogeneity of the 289F/K. 25 cotton crop and that as the immediate objectives have been attained, further improvement will be looked for in pure line selection.

(c) **Physiological Scheme.**—Partial failures of the American cotton crop in the Punjab occurred in the years 1919 to 1921, 1926 to 1928, 1931 and 1932. The external symptoms of the cotton plants during these failures were early reddening and shedding of the leaves, premature opening of the bolls with immature seeds and low quality lint and, in extreme cases, the dwarfing of the plants. To account for these failures, various views were advanced, such as the heat stroke theory (Milne, 1924), attack of White Fly (Roberts, 1929) and unfavourable combination of climatic and biotic factors (Trought, 1931). As, however, these theories could not be supported by sufficient data, it was thought that the failures might be due to malnutrition of the plant and a physiological scheme was accordingly started by the Committee in March 1935, to study the physiology of the cotton plant with a veiw to determining, if possible, the nature of the nutritional disorder, its causes and the measures necessary to combat it. The scheme started work in 1935. In March 1937, the Empire Cotton Growing Corporation loaned the service of Dr. Mason to the Committee to inspect and report on the scheme and, on his recommendation, a soil survey on a large scale was undertaken to connect up soil conditions with cotton failure. The scheme is due to terminate in March, 1943.

The work done so far has indicated that two sets of soil conditions are associated with the development of '*tirak*,' *viz.*, (*i*) soils with saline sub-soil and (*ii*) soils with nitrogen deficiency. These conditions may exist separately in separate fields or together, the intensity varying from field to field.

The growth of plants is normal, in the earlier stages of development on both the soil types. From the flowering stage the plants on light sandy soils deficient in nitrogen are characterised by yellowing and reddening of leaves followed by premature defoliation. The leaves of the plants on soils with saline subsoil exhibit drooping from the middle of August onwards. Wilting becomes more and more accentuated with the advance of time after every irrigation. The leaves do not turn yellow before they are shed.

The association of a chemical substance giving tannin reaction with the deficiency of nitrogen is another important finding which serves as a biochemical index of nitrogen starvation. By subjecting the water-extract of a few bits of cotton leaves to 'tannin test' in August, it is now possible to forestall whether the cotton crop in a particular field requires application of nitrogenous manure or not. If the 'tannin test' is positive nitrogen applications will prevent the development of '*tirak*' on light sandy lands.

Extra water at the fruiting stage has been found to ameliorate '*tirak*' and give increased yield only on soils which are saline in the subsoil. Additional water supply will not, however, have any appreciable beneficial effect on light sandy soils where '*tirak*' is caused by nitrogen deficiency. Similarly applications of manure will ameliorate '*tirak*' on light sandy soils but not on soils possessing saline subsoil. In order to obviate the difficulty experienced in distinguishing the soil types and deciding upon the correct remedy, a common ameliorative measure for the two abnormal conditions has been devised. It consists in delaying the sowing of cotton in general. The optimum period for sowing American cotton has been indicated to be in the month of June rather than in May. There was a substantial improvement in the opening of bolls in respect of late sowings irrespective of the soil types.

When sowings were done in June, the number of bolls per plant was reduced, affecting the yields adversely even though '*tirak*' was ameliorated. This disadvantage that accompanies late sowings is counteracted by sowing the rows at 2 ft. instead of at 3 ft. and by reducing the distance between plant to plant. This practice would increase the number of plants per acre and a reduction in boll number per acre will be avoided.

June sowings do not suffer from a decrease in yield on normal fertile lands which are neither deficient in nitrogen nor are saline in the subsoil. Thus June sowings can be practised as a general measure to combat '*tirak*' in spite of the great heterogeneity of Punjab soils.

Two schedules have been prepared on the basis of experiments conducted during the past few seasons ; one giving details of the optimum sowing time for the commonly-grown American varieties in the different districts, and the other furnishing particulars of the changing seed rates and spacings with the advancing sowing dates.

Several experiments conducted to investigate the need for additional watering late in October showed that neither early nor late sowings profited by an extra watering after the 15th October. The late sown crop practically finishes at the same time as does the early sown and thus there is no special danger of frosts to the June sown crop. In addition late sowings of cotton fit in well in the agricultural programme. Further, late sown crop if closely spaced (2 ft. distance between rows) suffers much less damage from jassids than that spaced widely (3 ft. distance). It was observed that the jassid attack

was severe whenever the June sown plants did not make sufficient growth on account of salinity near the soil surface.

During the year under report a large number of farms located in the different circles of Montgomery, Multan and Sarghodha districts have been selected and sowings of cottons have been arranged according to the two schedules referred to. In addition several plots to demonstrate the importance of deferring sowings have been arranged in collaboration with the district staff.

The work during the season has revealed that the greater spread of '*tirak*' in certain years is explicable in terms of the interaction of saline subsoil conditions with the temperatures during the months of September and October. Whenever September and October are hot and dry the internal water relations of the plant are unusually strained in soils which are saline in the subsoil. '*Tirak*' in such years is intensified, besides, it spreads to patches, which have medium or low salinity.

The correlation coefficients between the temperatures above normal during the spell of eight days or more in the months of September and October and yields of cotton from 1921-40 for three different districts and for three commercial firms had been worked out and it was found that the correlation between two factors was negative. Thus higher temperature than normal during the spells of dry and warm weather were associated with low yields.

The development of '*tirak*' on a field has been found to depend on three factors: (1) degree of salinity in the subsoil, (2) temperatures in the months of September and October and (3) sowing time. The interrelation of these factors is as follows :—

1. Under given conditions of temperature and sowing date resistance to '*tirak*' declines as salinity increases.

2. Under given conditions of salinity and sowing date resistance to '*tirak*' declines as the temperature in the month of September or October increases above normal in long continuous spells.

3. Under given conditions of salinity and temperature resistance to '*tirak*' increases as the sowing time advances from May up to the end of June.

The causes of variations in the yields of *kapas* in the same field from year to year are explainable on the basis of the above three principles.

(d) **Root Rot Scheme.**—This scheme, which was sanctioned by the Committee in 1932, is concerned with the investigation of the cause and control of root rot in the Punjab, where, particularly in the canal irrigated areas, the annual damage done to cotton by this disease is estimated at several lakhs of rupees. Both *desi* and American varieties are equally affected by the disease which makes its appearance towards the end of June and continues up to the middle of September. The organisms responsible for the disease are *Macrophomina phaseoli* and *Corticium solani*.

During the year under review, the experiments conducted in different places, under canal irrigated conditions, generally corroborated the results obtained in the previous years, *viz.*, that the incidence of disease is high in the May sown crop and is markedly reduced in the early and late sown cottons, and that the disease is effectively checked when cotton is grown mixed with *moth*. In view of the effectiveness of late sowing in the control of *tirak* in addition to root rot, June sowing is now being adopted as a general practice by the cotton growers in several parts of the canal colonies.

The efficacy of mixed cropping with *moth* in the control of the disease was found to be greater when both crops were sown on the same day than when *moth* was sown a month later. The increase of yield in plots grown mixed with *moth* was markedly greater in the case of American cottons than in that of *desi* cottons. The differences in yield have, however, not been statistically analysed.

(e) **Cotton Jassid Investigation in the Punjab.**—This scheme is concerned with the study of the Jassid insect in the Punjab, as regards its habits, alternative host plants and characters of the cotton plant which determine resistance to the pest.

During the year under review, jassid attack, was severe at Lyallpur, Okara, and Sargodha, mild at Montgomery and Jhang and negligible at Khanewal and Multan. Of the seven varieties tried in a replicated experiment to test their response to jassid infestation, 289F/K.25 and 124F were found to be most susceptible and 199F most resistant; the remaining four—L. S. S., 4F, 289F/43 and 148F—occupied intermediate positions.

The study of the effect of agronomic factors on jassid population showed that the different spacings did not affect the population while heavy irrigations were conducive to greater concentration of the insects. Of the morphological characters, density and length of hairs on the leaf veins appeared to contribute to resistance in the case of the American varieties ; this correlation, however, did not hold good in the case of *bhindi* and 39 Mollisoni.

Cambodia Crosses stood up very well, showing no appreciable ill effects of the attack even under severe conditions of infestation.

CENTRAL PROVINCES AND BERAR.

Central Provinces and Berar Cotton Breeding Scheme.—The Central Provinces and Berar Cotton Breeding Scheme was sanctioned by the Committee for a period of five years with effect from the 1st April, 1939, and replaced the Central Provinces Botanical Scheme which terminated on the 31st March, 1939. The object of this scheme is to evolve, by selection or hybridization, suitable new strains of cotton which can compete successfully with the local *Oomras* in point of ginning outturn and yield and which, at the same time, possesses a staple capable of spinning between 20s to 25s highest standard warp counts. The scheme is worked at Nagpur and at Akola, to suit the special requirements of the Central Provinces and Berar, respectively. The work done during the year is described below under ' Central Provinces Cotton Breeding Scheme' and ' Berar Cotton Breeding Scheme.'

The Central Provinces Cotton Breeding Scheme is concerned with the breeding of improved strains of cotton suitable for Nagpur, Wardha, Chanda and parts of Chindwara districts and capable of replacing the ordinary short staple mixed cotton of these areas.

The total area under V. 434 in different parts of the province during the year was some 4.1 lakhs acres, against 2.72 lakhs acres in the previous year. Of this, the area in the Central Provinces was about one lakh acres and that in Berar 3.1 lakhs acres, compared with 63,471 acres and 1,96,389 acres, respectively, in the previous year. The yield of V. 434 on the Government Farm, Nagpur, averaged 472 lbs. per acre while on the Akola Farm, it was 745 lbs. per acre.

During the year, a large number of selections derived from Bani x *Cernuum* cross, H. strains, V. 434, local *Jadi*, etc., were tested in single

lines at Nagpur and 162 plants with a lint length of over $\frac{7}{8}''$ and a ginning percentage of 33 to 42 were selected for further study. Another set of ten progeny bulks, which have been breeding true, were grown in small randomised and replicated plots, with V. 434 as the control. Progeny No. 6 gave significantly higher yield than the rest except No. 7; another progeny "1" is said to be superior to the control in respect of lint length and ginning percentage.

Yield trials were carried out with V. 434, H. 415, H. 420, *Jarila* and local *Jadi*, in 30 representative centres of Nagpur, Wardha and Nimar districts in the Central Provinces. Eight trials failed completely, and in eight others, H. 420 was either on a par with the local or superior to it; in five of the remaining trials the local *Jadi* proved to be the best in respect of yield. The H. strains—H. 415 and H. 420—however, proved distinctly superior to V. 434 as regards quality of lint and ginning percentage. Both these strains have been adjudged suitable for spinning up to 34s highest standard warp counts against 26s of V. 434 and 24s of Jarila.

The Cotton Breeding Scheme at Akola is concerned with the production of high yielding superior strains of cotton suitable for the Berars and possessing a staple of at least 3/4", with the softness, colour, and strength of V. 434 and a ginning percentage above 33. Breeding of high ginning new strains of Buri cotton for the Burhanpur tahsil also forms part of this scheme. At the Akola farm, 564 plant pogenies—426 of *desi* and 138 of Buri—were raised; 15 from the former and 7 from the latter appeared to be promising.

Eight promising *desi* selections were tested for yield against V. 434 and local *Jadi* in small randomised plots. Selection No. 487 and the local *Jadi* gave significantly higher yield than the remaining strains but the difference in yield between the selection and *Jadi* was not significant. Selection No. 487 has an average staple of 12/16" to 13/16" and a ginning outturn of 40%.

District trials were carried out with the same strains as in the Central Provinces, *viz.*, V. 434, H. 415, H. 420, *Jarila* and *Jadi*—in 30 representative localities of Berar. The results showed that in only 10 trials was the 'Z' test satisfied.

During the year, Buri 103 and Buri 107 were tested against the local Buri in 7 centres in Berar and the Nimar district. In two trials, Buri 103

gave significantly higher yield than both Buri 107 and local Buri. The results of the remaining five trials showed that the yield differences between the varieties were not statistically significant.

On the Akola farm Buri 107 gave an average yield of 953 lbs. per acre. The total area under this strain in the Burhanpur tahsil of Nimar district was about 34,000 acres.

MADRAS.

(a) **Pempheres Scheme.**—This scheme, as originally sanctioned and started in 1931, consisted of two investigations, one for the cotton stem weevil (*Pempherulus affinis*), and the other for the evolution of a strain in *Karunganni* cotton, resistant to the harmful effects of February rains. The second investigation was terminated in 1938 as the experimental work had been brought to a stage when further work could be continued by the Agricultural Department itelf. The problem of the control of the cotton stem weevil was pursued in three directions, botanical, biochemical and entomological. In 1938, when the work was reviewed, it was felt that the latter two aspects could be stopped and the former one, *i.e.*, the botanical aspect, could be pursued as indications were obtained to the effect that quicker and more tangible results could be secured by concentrating attention on the breeding side. Work was confined during the year under report to this aspect only.

As in previous years, two generations of plants were raised during the year, one from March to August at Srivilliputhur and the other from September to March at Coimbatore. Unlike in previous years the plant mortality which used to be practically nil at the former, and high at the latter centre, was equally high at both centres during the year. The conditions were therefore favourable for marking out the resistant biotypes. Co. 2 recorded an average of 20 and 24% mortality and 78 and 74% adult emergence at Srivilliputhur and Coimbatore, respectively. Twelve cultures were tested at Srivilliputhur of which four recorded statistically higher yields and mortality below 10%. Out of thirty one cultures tested at Coimbatore, five alone combined yield and pest resistance. Two of these were consistently better in both the characters during the past two seasons. Resistant cultures 7178A/A. 1, 7178A/A. 2, 7178A/A. 3 and 7178-1/D. 1 of which mention was made in the last report recorded low yields during the year, and were discarded despite their past resistant quality. In addition 265 and 1317 cultures were tested in progeny

rows at Srivilliputhur and Coimbatore, respectively. Of these, 424 had higher yields and better insect resistance than the standard Co. 2. Forty-six cultures showed no deaths at all; most of the promising cultures were derivatives of crosses between the poor yielding, late maturing, pest resistant cultures and the more productive, early maturing but insect susceptible strain of x 4463. The results indicated that this kind of crossing had been useful.

Experiments were laid out to find out if planting of other crops with cotton would reduce the weevil incidence. *Cumbu* (*Pennisetum typhoides*), *Tenai* (*Setaria italica*) and *Ragi* (*Eleusine coracana*) were planted along with Co. 3, a susceptible strain of cotton. It was observed that *Cumbu* and *Tenai* were too aggressive to permit the normal growth in cotton and as a result the yields were low. *Ragi* was the best for growing in association with cotton as the yields of both the crops were fairly high. There was however no appreciable reduction in plant mortality. The object of the experiment was thus not fulfilled, although indications were obtained about the greater remunerativeness of mixed cropping.

(b) Scheme for Improvement of Mungari Cotton in Madras Province.— This scheme was sanctioned by the Committee in 1937 and has for its object the evolution of strains suitable to the red soils and combining the quality of the *Westerns* with the yield of *Mungari*, to replace the inferior *Mungari*, the existence of which affords opportunities for mixing, with the result that the better cottons of the tract fail to get their proper value. On the black soils of Anantapur, Bellary and Kurnool districts of the Madras Province, cottons commercially known as *Westerns* and *Northerns* are grown. These are medium staple varieties, capable of spinning 24s to 32s. The type of cotton grown on the red and mixed soils, on the other hand, is that known by the name of *Mungari*, which is a coarse, short staple variety, similar to *Bengals*, and not fit to spin more than 8s or 10s. The co-existence of these widely different varieties in the same tract favours undesirable mixing, with the result that the better cottons suffer in value. It is to overcome this difficulty that the Mungari scheme was started.

During the year under report, the sowings commenced late owing to the partial failure of the seasonal rains; as a result, yield levels were low and the small leaf disease was not much in evidence. Ten strains including *Jarila*, ×4463, Co. 4, 710, V.434 and 6042 were tested for yield against *Mungari* on both red and light black soils. Four were equal to the standard. One of these—

strain 6042—was uniform in its behaviour for the past three seasons. It is capable of spinning 40s but its ginning outturn is low. Strains V.434 and Co. 4 were definitely lower than the control in respect of yield on the red soil. Five of the above strains were compared in three other taluks. One, *viz.*, strain 710, was distinctly better than the standard in two taluks and lower in the third. Another strain—6042—was equal to *Mungari* in the three taluks.

During the year under review three hundred and nine cultures were tested in single rows but only eleven were found to be superior to the control. Experiments were carried out to study the effect of time of sowing on the yield of the varieties and on the degree of incidence of the small leaf disease. In the varietal test, the results were not decisive, while in the other, the disease was absent in the later sowings. Experiments were also designed to determine the nature of the small leaf disease. Plants grown in insect proof cages were grafted to the diseased plants and 51% of the grafted plants were found affected by the disease. When the cotton plants were infested with certain bugs that cause similar disease in other crops, it was found that none of them was able to transmit the disease. It was therefore inferred that the disease might be of virus origin.

The experiments laid out during the year, to determine the efficacy of the cucumber crop for controlling the red hairy caterpillars, indicated that the damage could be lowered considerably by growing this crop all round the plots and by a systematic picking of the caterpillars from these plants.

(c) **Scheme for Improvement of Cocanadas cotton in Madras Province.**—This scheme was sanctioned by the Committee in November 1938, for a period of five years. The work was started from 1st February, 1940. The object of the scheme is to improve the yield and ginning percentage of Cocanadas cotton, preserving at the same time the light pinkish colour of its lint, owing to which it is in great demand for the manufacture of dyed yarns.

As the Cocanadas cotton is cultivated on both black and red soils, arrangements were made to sow the seed material at two places, *viz.*, at Narasaraopet to represent the red soils, and at Agricultural Research Station, Guntur, for black soils.

Colour improvement being one of the objectives of the scheme, greater attention was paid to investigate the limits of variation in the different standard

lint colour grades. Seeds of plants representing five standard grades were sown in six agricultural research stations. When the *kapas* of each plant were analysed, it was observed that grades 2 and 3 were not different from one another. Grades 4 and 5 were likewise similar. All the above four grades showed dilution in colour, the dilution being greater at Coimbatore than at other places. It was further noticed that the colour was not influenced by the time of sowing and that wide variations were present in the colour of the lint produced on the same plant even after removing the effect of exposure. Studies of the effect of exposure showed that all grades except No. 1 deepened in colour within certain limits peculiar to each grade. It was clear from the observations that the standard grades needed regrouping based on the ranges of variation in each, and that the upper limit of improvement of lint colour in Cocanadas cotton by the method of single plant selection could only be grade 3. Further intensification in colour is possible only by crossing it with imported varieties. It is stated that amongst the Asiatic cottons the highest grade of lint recorded so far was 5, while in the Americans the depth reached grade 7. Arrangements were made to cross the standard strain in the Cocanadas variety, *viz.*, x 20 with higher grades up to 5. Besides, a Cambodia strain having lint of grade 1 was crossed with cottons of grade 6 and 7 with the object of evolving a type of American cotton suited to the red soils of the tract. The studies also indicated that it would be necessary to determine whether the lint colour standards used by the trade were the result of genetic or environmental factors. Such a clarification would be necessary since, in case the former set of factors was found responsible for deeper colour, it would not be possible to combine lint length and colour owing to the negative correlation existing between them.

During the year under report, eight hundred and thirty cultures were grown in progeny rows. The examination of cultures sown in July alone had been completed. Twenty two out of one hundred and twenty one were pure for deeper colour. Eight of them had high ginning percentage and fairly good lint length. When the collections made in the survey were tested in progeny rows, it was noticed that those made in Godavari district had high heritable variability for colour of lint and those from other districts showed low variability. In addition, seeds from three villages reputed for high yields were sown for comparison with the standard Cocanadas strain x 20 in August and September. The results indicated that the bulk from Gollaprolu in Godavari district contained a larger number of plants with high productivity. Observa-

tion plots with Cocanadas strain x 20, Gurzala bulk, Kanigiri bulk, and local bulk as variants were arranged at three centres in Nellore district with the object of finding if x 20 would replace the local white cotton which is an undesirable cotton in a tract growing coloured cottons. The results showed that in two places x 20 outyielded the local, while in the third it recorded a lower yield. The Gurzala bulk which was considered by the trade as No. 1 cotton for the tract not only yielded less but also deteriorated in colour.

UNITED PROVINCES.

The United Provinces Botanical Scheme.—This scheme was sanctioned by the Committee in 1938 for a period of five years. The object of the scheme is (1) to develop improved strains of Bengals cottons, for the rain-fed and irrigated tracts of the United Provinces, from the material collected in the course of the survey of cottons in Rohilkhand and Bundelkhand, (2) to test the suitability of the United Provinces improved cottons—C. 402, C. 520 and Perso-American—against local and other promising introductions, both on Government farms and cultivators' fields, and (3) to investigate the possibilities of American cottons under the United Provinces conditions.

The comparative yield trials of C. 520/2, C. 402/6, strains A. and D from the survey material and Perso-American, carried out during the year at 9 centres under irrigated conditions, with C. 520 and local *desi* as controls, are stated to have established, for the third time in succession, the general superiority of the survey variety 'D' in respect of yield. This variety gave the highest yield at five centres and C. 520/2 and Perso-American the highest yield at two centres each. Strain 'D' outyielded C. 520 significantly at four centres and C. 520/2 at two centres. In respect of quality, strain 'D' compares favourably with C. 520, and in respect of ginning percentage it is definitely better. The comparative acre cash values show a profit of Rs. 3-4-0 and Rs. 1-2-0 for 'D', over C. 520 during the years 1939-40 and 1940-41, respectively. Under unirrigated conditions the results were inconclusive, as almost all the experiments failed due to late rains and prolonged drought.

In the trials designed to study the behaviour of the Punjab-American types, L.S.S., 289F, N15, 100F, 83F, under the United Provinces conditions, Perso-American was outyielded significantly by L.S.S., 289F and N. 15. The latter were also much superior to Perso-American in respect of spinning performance. The experiments conducted are reported to have indicated

the possibility of establishing in the United Provinces long staple cottons spinning over 30 counts. Perso-American is said to be gaining popularity in the Province ; its acre cash value is estimated at Rs. 39-14-0 more than that of C. 520.

BENGAL.

(a) **Comila Cotton Scheme.**—This scheme was sanctioned in February 1933 and came into operation in December 1934. It is concerned with the improvement of the commercial characters of *cernuum* cotton by the isolation of coarse, high ginning and good yielding strains suitable for mixing with wool. In view, however, of the apparent absence of *cernuum* cotton and predominance of *neglectums* in the tract, it has been decided to extend the breeding work to the *neglectums* and to find out whether useful ecotypes suitable for Chittagong hill tracts can be isolated from the *cernuum* collection obtained from the Garo hills of Assam.

The season during the past year was very unfavourable for the cotton crop due to unprecedented rainfall of 125″ against the normal of 95″, and some of the experiments had to be abandoned. Sixty-five cultures were tried in replicated progeny rows but 38 had to be discarded due to poor stand. Significantly better yield was obtained in eight cultures, but only four of these gave better ginning outturn also.

The survey of the Bhomong Circle was completed and the samples collected were found to possess a high ginning outturn (42%) and a coarse short staple (18 mm.). A wide range of samples were also collected from Manipur State, Naga hills and Garo hill district for trial under Chittagong conditions. Two yield trials were conducted on the Sapchari *Jhoom*, one with five strains and the other with six, but owing to bad season, the yields were low and the differences between the strains were not statistically significant. Strain No. 9 gave the best yield. The ginning outturn and coarseness of the cottons, however, were not affected by the abnormal conditions. While the crops within a radius of 105 miles of the *Jhoom* completely failed, the improved types gave some yield indicating that they can stand the adverse seasonal conditions better than the local.

(b) **Scheme for cultivation of long staple cotton in Bengal.**—The object of this scheme is to test the possibilities of introducing long staple cottons in the well drained highland soils of Bengal. It is financed jointly on a 50 : 50

basis, by the Provincial Government and the Bengal Millowners' Association and it came into operation in April 1938. In January 1941, the Indian Central Cotton Committee agreed to provide a supervising officer for the scheme for a period of two years. In addition to supervising cotton cultivation work at the different centres, the officer will also undertake botanical work.

The past season in Bengal was very unfavourable for cotton growing owing to unusually heavy and continuous rainfall in the months of October and November. Dacca 289F is said to have suffered the most in respect of yield on this account.

Six varieties, *viz.*, Dacca Cambodia, Dacca Parbhani, Dacca Buri (107), Dacca Dharwar and Dacca Kampala were tested at the Dacca Farm in replicated randomised experiments. Dacca Parbhani gave the best results, combining good yield with high ginning capacity and long staple.

Trials with cotton cultivation were undertaken at six centres in six districts on a compact block of 20 to 50 *bighas* at each centre. It is reported that the centres at Naokhali and Malda had to be abandoned owing to the indifference of the cultivators towards the crop. Out of the remaining four centres, Rangpur was found to be the best. The yield of Dacca 289F, however, did not come up to expectation, being only 6 *maunds* or 492 lbs. per acre. Dacca Parbhani, which was tried in 1 to 3 *bigahs* at each of the centres, proved to be promising in all the localities; its yield at Rangpur, Jessore and Nadia was 13½ *maunds*, 10½ *maunds* and 10 *maunds* per acre, respectively. It is stated to have also proved to be highly resistant to anthracnose and other diseases. Owing to its excellent performance in all the centres in respect of yield and capacity to resist disease and adverse seasonal conditions, it is proposed to grow as much area as possible under it in the coming season.

BALUCHISTAN.

Scheme for co-ordination of Research on Black-headed Cricket in Sind and Baluchistan.—The scheme for the control of Black-headed Cricket in Baluchistan was originally sanctioned in August 1939, for a period of two years, to run concurrently and in co-ordination with the scheme for investigation into the Black-headed Cricket in Sind sanctioned by the Committee in January 1938. The combined scheme for the co-ordination of work in progress in Sind and Baluchistan was sanctioned in January 1941, for a period of three

years from the 1st April, 1941. The objects of the scheme are : (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures, and (3) to control and prevent the pest by means of poison-baits.

The control work, during the year, was carried out on the lines of the previous years. Poison baits were distributed in 19 villages in Baluchistan. It is reported that there is an increasing realisation on the part of the *zamindars* regarding the damage caused by the pest and the necesssity for its control, though their attitude is still largely one of expecting free help from Government.

HYDERABAD.

(a) **Botanical Research Scheme.**—The object of this scheme, which was sanctioned by the Committee in 1929, is to study the several varieties of cotton grown in Hyderabad and to secure from them high ginning medium staple types, to replace the existing varieties in the different parts of the State. A large number of improved pure strains has been evolved under the scheme, amongst which *Gaorani* 6 is the most outstanding. The scheme was extended in July 1938, for a further period of five years from the 1st April, 1939.

The headquarters of the scheme were transferred during the year to the new Cotton Research Station at Nanded. The work in connection with the production of wilt-resistant types of *Gaorani* is, however, being continued at Parbhani, as part of the newly sanctioned scheme for the improvement of *Oomras* cotton.

During the year under report, a varietal test was conducted at each of the three centres, Nanded, Latur and Madhol, with three or four improved *Gaorani* strains, the local and *Jarila* being used as controls at the former two places and *Gaorani* 6 at the latter place. The improved strains, G. 12F-2, G. 4M-11 and G. 6, tried at Nanded, yielded significantly better than either of the controls. In Latur, G. 16C proved to be the best type, and at Madhol none of the strains outyielded *Gaorani* 6 significantly.

Comparative trials were also carried out at Nanded, Latur and Madhol, with 24, 20 and 16 Gaorani strains, respectively. Twenty three strains gave significantly better yields than the local at Nanded and of these nine

outyielded *Gaorani* 6; amongst the latter nine strains, *Gaorani* 12F-2, G. 162 and G. 163, were found to be wilt resistant also. At Latur, the yields of 17 strains were significantly higher than the control. G. 16C, which was one of the strains included in the test at Latur last year, maintained its performance this year also but it is susceptible to wilt. The test at Madhol showed that none of the improved strains was better than *Gaorani* 6 in respect of yield, though two strains, G. 4M-11 and G. 12F-2, were wilt resistant.

Over four hundred single plant selections were tested for wilt resistance in a highly wilt infected plot at Latur. Five progenies recorded nil mortality and three 3-5% against a range of 21-88% of the control. All the promising types, of which there were 134, have been retained for further study. District trials were undertaken with 2 or 3 improved strains and the local variety in 28 centres in the *Gaorani* protected area and 12 places in east and west Telingana. The data obtained so far have not yielded any definite results.

(b) **Scheme for improvement of cotton of Oomras tract in Hyderabad State.**—This scheme was sanctioned by the Committee in August 1940, for a period of five years, and it came into operation on the 8th October, 1941. The object of the scheme is to improve the cotton of the "*Oomras*" tract of the State. This is sought to be achieved—

(1) by the production of an early maturing and high ginning strain of *Gaorani* 12F, for the eastern half of Parbhani District and Hadgaon taluka of Nanded district,

(2) by the production of an early maturing and high ginning strain of Parbhani American, for the Ghat area of Aurangabad District,

(3) by evolving a wilt resistant strain from G. 16C, by crossing it with New Million Dollar, for the western half of Parbhani District and part of Bhir District,

(4) by breeding a high ginning, quick maturing, wilt and drought resistant variety capable of spinning 12-16s highest standard warp counts, for the southern half of Aurangabad District.

During the year under review, 963 single plant selections were tested against the susceptible G. 6 for wilt resistance in a highly wilt infected plot. Four progenies showed nil mortality, four more 3% or less and five others

between 3 to 5%, compared with 50-100% mortality of the control. II-41-6838, a sib from 16C, had a mortality of only 4·3%. Material of ten promising strains of *Gaorani*, showing a fair degree of wilt resistance, has been sent to Poona, for testing under controlled conditions. In the wilt-sick plot at Parbhani, it was noted that the mortality in all the strains except II-40-6106 was higher than in the previous year. This strain is said to have shown high resistance even under controlled conditions at Poona.

In the yield trial carried out with 58 wilt resistant strains on wilt-free soil, it was found that the yields of 26 strains were statistically better than Parbhani local, but only 8 outyielded *Jarila* significantly. When tested on wilt-sick soil ten out of 58 maintained their resistance to the disease and six of them gave high yield also.

At Parbhani, the *Gaorani* strains—G. 16C and G. 12F-1—proved to be significantly better than Parbhani-American 1 in respect of yield. The results of the varietal tests conducted on the main farm and the Research Station, Parbhani, showed that *Gaorani* 12F-2 is promising as regards yield and spinning capacity.

During the year, about 1,000 fresh single plant selections were made in the crop raised from the seed samples obtained from villages in the *Oomras* tract, for study in the ensuing season.

Comparative trials were undertaken with 2 or 3 improved strains and the local variety in different centres of the districts of Parbhani, Aurangabad and Bhir. The data collected indicated that G. 16C was on a par with the local in East Parbhani, while in the Western part of the State, *Jarila* proved to be better than G. 16C. On the light soil of the Ghat area, *Jarila* and G. 16C gave significantly better yield than Parbhani-American 1. In one centre of the Ghat area, Parbhani-American 1 outyielded the local variety. The trials will be repeated in the coming year to confirm the results obtained.

During the season, ten strains of *Gaorani* received from Parbhani were tested in the glass house at Poona for wilt resistance. Strain II-39-5315 showed a high degree of resistance. 104 plants were selected for transplanting in the infected plot.

(c) **Scheme for improvement of Kumpta Cotton.**—This scheme was sanctioned for a period of five years and it came into operation in November 1937. The object of the scheme is to develop certain strains of *Kumpta* cotton bred

from the local variety of Raichur which, in the preliminary tests conducted at the Government Experimental Farm, Raichur, prior to the starting of the scheme, had given better yields of both seed-cotton and lint than either the local variety or improved *Jayawant*. After two years' work, the strain Raichur-*Kumpta* 15 was selected for further development. It was sown in 1939-40 on an area of about 40 acres in a cultivator's field, and an average yield of 293 lbs. of seed cotton per acre was obtained. Though this yield was a good deal better than the average of the local variety in the adjoining fields, the Committee, at its meeting held in August 1940, suggested that this strain should not be distributed on account of its susceptibility to wilt, and that strain R. K. 19 should be tested instead and attempts made at once to produce a wilt-resistant *Kumpta* type.

During the year under review, the varietal tests conducted with the three strains of *Kumpta*, Hagari and the local on the heavy black soil proved a failure as, owing to the spell of dry weather that followed the sowings, the plants withered in patches and the yields obtained were very low. Strains R. K. 15, 19, 25 and nine wilt resistant strains were tested in another experiment against Hagari and the local variety on light black soil, where the crop-growth was found to be fairly good in spite of adverse climatic conditions. Nine strains in all gave significantly higher yield than the local and ten higher than Hagari. Of these, six strains, including R. K. 19, were found to be fairly resistant to wilt at Hansihalhuda; R. K. 25, R. K. 19 and two of its sibs, II-40-1214 and II-40-1219, were also drought resistant.

Six hundred and ninety-two fresh selections were tested in single rows in wilt-infected land at Hansihalhuda; seven progenies had no mortality, four showed 3 to 5% mortality and 17, 5 to 10% mortality against 33—90% mortality of the control. In the district trials, R. K. 19 came up well, its only defect being that it is late-maturing.

(d) Scheme for inclusion of Northerns and Westerns Cottons in Programme of work of Dry Farming Scheme at Raichur.—This scheme has a two-fold object, *viz.*, (1) to consider the possibility of growing medium and long staple cotton in short staple areas in India, and (2) to find out how far the devising of dry farming methods would go hand in hand with the successful growing of such cottons in the dry and low rainfall tracts of the country. It was sanctioned by the Committee in March 1937 and terminated on 31st March, 1942.

During the year the variation induced by the seasonal factors, chiefly rainfall, was of such magnitude as to nullify the treatmental effects to a considerable extent and to render the results inconsistent in the various experiments. Amongst the varieties that were under trial, strain N14 proved to be promising, giving on an average 6% more yield than the local kumpta. RK. 15 and RK. 19 also gave good yields.

BARODA.

(a) **Root Rot Scheme.**—This scheme which has for its object the study of the root rot disease of cotton in Baroda and the production of strains resistant to it, has been in operation since February 1932.

The results obtained, during the year under review, showed that *karkhadi* is distinctly less susceptible than B. 9; the average mortality in the former was 46%, which was 15% less than in the latter. Differences in the mortality between the various *karkhadi* families were not significant.

Fourteen families of *karkhadi* which showed superior resistance in previous seasons together with one bulk of the general *karkhadi* were tried in a yield trial along with B. 9 as 'Control.' The yield data when adjusted to stand failed to show any significant differences between the yields of the several families, the yields of families, 52, M-6, 25 and 22, were, however, superior to Broach 9, but not significantly.

It is stated that notwithstanding the high death rate observed this year in the *karkhadi* material, about 18 progenies were found to suffer 30 to 40% less mortality than the control, thus providing material for further selection. The present *karkhadi* stock has been replenished by a considerable number of fresh selections from the districts. Selection is proposed to be made also in *Rozi*, which, though inferior in quality, is resistant to root rot.

(b) **Scheme for improvement of Mathio cotton at Amreli.**—This scheme has for its object the improvement of *Mathio* mixture in respect of yield ginning percentage and quality and the trial at Amreli of the early strains of *Wagad* evolved at Viramgam with a view to replacing, if possible, inferior *Mathio* by early *herbaceums*. The scheme came into operation in June 1937.

During the year under report, ten families and 22 selections from local *Mathio* were tried against C. 520; seven families from the former and five progenies from the latter have been retained for further testing. Out of the

seven families, S. 21-2 and S. 24-2 were by far the best, combining good yield and ginning percentage with superior lint quality. The results of the varietal trials have shown that S. 18 and S. 20, types evolved from *Mathio*, are better than C. 520 in respect of yield, and S. 6, S. 9 and S. 18 superior to it as regards ginning percentage. S. 6, S. 18, S. 19 and S. 20 which are desirable in all respects have been retained for study in the ensuing season.

About 1000 plants from the F2 generation of the crosses made between two high ginning, good yielding local types, *viz.*, S. 5 and S. 6 and *Jarila*, were studied during the season and selections, with desirable combinations of characters, have been made for further study.

BIKANER.

Bengals Cotton Improvement Scheme.—The opening of the Gang Canal under the Sutlej Valley Scheme resulted in the colonization of a new and virgin area, known as the Gang Canal area, with immigrant peasants, mostly from the Punjab, who were accustomed to the cultivation of the Punjab *desi* and American types of cotton. These cultivators found it difficult to successfully cultivate cotton under local conditions, evidently because the new environment was not quite the same as they were accustomed to in the Punjab. This scheme was, therefore, started in January 1931, for the purpose of studying the local problems of the agriculturist and for obtaining by selection and hybridization one or more superior types of cotton suitable to the locality. Until 1934, the botanical work was confined to the testing out of a large number of outside varieties, both *desi* and American. After that year, however, extensive survey of the Rajputana tract was undertaken to collect breeding material; at the same time, extensive trials of the few selected cottons from outside were continued to test their suitability to the tract. Agronomic work was pursued intensively from the beginning of the scheme. At the end of the first five years, it was found that C. 520 was the most profitable cotton to grow in the tract and that the American cottons were generally unsuitable because of their low yield and susceptibility to disease. Also the staple of Punjab-American cottons was found to deteriorate both in length and strength when grown under Ganganagar conditions. A large amount of data and useful information regarding sowing times, seed rate, frequency and distribution of irrigation, optimum spacing for the *desi* and American cottons, rotation and manuring have been collected. Since 1934, greater attention has been paid to selection and breeding problems.

During the year under review, 63 progenies from the crosses—Shan x Mollisoni, Bani x C. 520 Shan x C. 520 and Rajputana x Mollisoni—were tested in two replicated progeny row experiments, against C. 520, R. 18 and Sang. 119. Families of the Shan cross were found to be better yielders than those of other crosses, but none of the progenies from any of the crosses was as good as C. 520, in respect of ginning percentage, though the maximum halo length of all of them was definitely superior to C. 520 and R. 18. Thirty-two of the best progenies have been selected for further study.

Variety trials have shown that R. 18 is equal to C. 520 in yield, halo length and spinning capacity, and significantly better than it in ginning percentage. Amongst the Americans, P. 289-F/43, which is now recommended to the cultivators, gave very satisfactory yields. The general level of field germination, during the season, was better than in the previous year. There was no difference between C. 520 and Mollisoni in final stand; 289F was, however, very poor in this respect. Measures taken against white-ant attack did not prove of avail.

MYSORE.

Mysore (Doddahathi) Cotton Scheme.—This scheme, which was sanctioned in 1935, is concerned with the breeding, from the local *Doddahathi* or American cotton, of suitable types, resistant to "red leaf" disease which stands in the way of the expansion of this crop in the Irwin Canal area in Mysore State.

During the year under report, the five strains, M.A.V. (Co. 2 x Uganda), M.A. VI (Uganda x Co. 2), M.A. VII (Co. 2 x 289F/38), M.A. VIII (289F/38 x Co. 2) and M.A. IX (a strain of irradiated Co. 2), were tested for yield against Co. 4 and M.A. II in a seaonal trial planted during January, February and March; March plantings gave the best results. M.V.A. gave a higher yield than Co. 4 and M.A. II; the yields of M.A. VI, M.A. VII and M.A. IX were the next best. M.A. VI is superior to the remaining strains in respect of fibre qualities, having been adjudged suitable for spinning 40s highest standard warp counts. M.A. V. and M.A. VI are now being multiplied on a large scale for distribution.

Amongst the several hybrid populations under study, the F4 of crosses of M.A. II and Co. 2 with *G. purpurascens* appeared promising in regard to disease resistance, staple length and ginning percentage.

Multiplication of the newly imported Egyptian cottons, Giza 7 and Giza 12, was started in June 1941, with the object of acclimatising and breeding suitable types. The response of these two types to local climatic conditions is stated to be very encouraging. In addition, a few more Egyptian and Sea Island cottons, *viz.*, Sakel, Maraad, Zagorra, V. 135 and Montserrat Sea Island, were tested on a small scale and selections made in all the types to obtain a hardy and well adapted type.

CHAPTER VI.

SEED DISTRIBUTION AND EXTENSION SCHEMES.

During the period under review, there were eighteen seed distribution and extension schemes in operation in the various cotton growing provinces and States ; a brief report on the working of these schemes is given below :—

BOMBAY.

(a) **Surat Seed Distribution Scheme.**—This scheme was first sanctioned in November 1929 for a period of two years. In December 1931, it was extended for another two years, pending the final decision of the Committee on the cotton policy to be adopted in the Surat area. In January 1934, after a thorough examination of the relative merits of 1*A* and 1027 *A.L.F.*, the Committee decided in favour of the latter and extended the scheme for five years for the distribution of 1027 *A.L.F.* seed in the Surat area. In November 1938, the scheme was extended for a further period of one year, in August 1939, for three years, and again in July 1942, for a period of two years from the 1st April, 1943.

During the year under report, the Agricultural Department controlled a seed multiplication area of 31,543 acres (including 1,360 acres grown with farm pedigree seed), against 20,640 acres (including 1,094 acres grown with farm pedigree seed), last year. It is reported that the demand for 1027 *A.L.F.* in Surat district was not as good as last year because many of the co-operative societies and Bardoli group villages reverted to the policy of growng Selection 1A or a mixture of Selection 1A and 1027 *A.L.F.* The amended Cotton Transport Act did not help much in the expansion of 1027 *A.L.F.* in Surat district. The Agricultural Department handled 25,34,690 lbs. of seed of which 10,38,837 lbs. were distributed in British area, 14,38,497 lbs. supplied to States and the rest disposed of locally, against 23,68,355 lbs. in the previous year, including 16,74,755 lbs. for the British area and 6,93,600 lbs. for the States.

Inspection and survey of the cotton area in Surat were continued. It was found that the 1027 *A.L.F.* controlled area was pure to a greater extent than in the previous year because the cultivators who were not in favour of

this seed dropped out altogether and only those who wanted to grow 1027 purchased the seed during the year. It is reported that the survey of Selection 1A revealed the same condition as last year, *viz.*, that the general tendency of cultivators was to grow Selection 1A, either pure or as a mixture, in preference to pure 1027.

Guaranteed pure cotton of 1027 *A.L.F.* was sold under two Agmark labels —red for pedigree cotton and black for certified cotton. It is reported, however, that there was no marked difference between the premium obtained for Agmarked 1027 and that obtained in the past years when no Agmark was applied. 420 bales of Agmarked pedigree cotton (red label) and 5,544 bales of Agmarked certified cotton (black label) were sold at premiums varying from Rs. 5 to Rs. 27. The premium obtained last year for 1027 *A.L.F.* was Rs. 6 to Rs. 22.

The following table shows the comparative figures of yield, ginning percentage, and price of 1027 *A.L.F.* and Selection 1A :—

Name of variety.	Yield of seed cotton per acre in lbs.	Ginning percentage.	Yield of lint per acre in lbs.	Price of *candy* of lint. (800 lbs.)	Price of lint yield per acre.
				Rs.	Rs.
1027 *A. L. F.*	300	33.3	100	300	37 8 0
Selection 1A	340	37.0	126	280	44 2 0

The table shows that the grower of 1027 *A.L.F.* gets Rs. 6-10-0 less per acre than the grower of Selection 1A.

(b) **Scheme for control of Selection 1A cotton.**—This scheme was sanctioned in November 1938, for a period of three years, subject to the condition that it should come into operation only if and after the Government of Bombay had isolated Olpad and part of Chorasi Taluka, and that it should continue only so long as this area was effectively isolated. On the fulfilment of this condition, the scheme came into operation in February 1940. In July 1942, it was extended for a further period of two years and two months. The objects of the scheme are (1) to confine the growth of 1A, as far as possible, to Olpad Taluka, by restricting the movement of cotton and cotton seed out of that area and by making provision for pure seed of Selection 1A for cultivation within the Taluka area, and (2) to check the cultivation of 1A in the rest of the Surat area by arranging for the distribution of adequate quantities of pure seed of 1027 *A.L.F.* and by intensive propaganda against Selection 1A.

During the season under report, 10 check stations (4 on the Tapti river and 6 on the Kim river) were established from the 16th January, 1942, to prevent illicit import of cotton by road from Olpad to the Surat and Ankleswar areas. Ginned cotton was allowed to be transported, under licence, to Surat for being pressed and marked " Olpad " before sale. The work was supervised by the Agricultural Overseer. 8,688 half-pressed bales were pressed into 14,344 full pressed bales after import under licence into the Surat protected area.

The survey of Selection 1A in Surat and South Surat areas, commenced last year, was continued during the year under report. It is reported that Selection 1A has spread almost everywhere in Bardoli and Navsari tracts. In Chorasi taluka, out of 20 villages visited, only 8 were found to be growing Selection 1A ; in the remaining talukas, Selection 1A was found more or less in all the villages visited, the percentage of area varying from 15 to 100.

An analysis of the prices obtained for pure 1027 *A.L.F.* and Selection 1A showed that in 1942 season, pure 1027 realised Rs. 10 to Rs. 18 premium over local and Rs. 12 to Rs. 24 over Selection 1A marked " Olpad," against Rs. 13 to Rs. 18 over local and Rs. 17 to Rs. 23 over Selection 1A marked " Olpad," last year. It is stated that the position of 1027 *A.L.F.* is in no way better than it was last year.

(c) **Jarila Seed Distribution and Extension Scheme.**—This scheme was sanctioned in March 1937, for a period of ten months in the first instance. It was extended in January 1938, for a period of one year, in November 1938, for three years and again in July 1941, for a further period of five years. Its original object was to replace *Banilla* in the Khandesh tract with *Jarila*, which is wilt resistant, over an area of some 1,55,000 acres. In view, however, of the general suitability of *Jarila* for the Khandesh area, the expansion now aimed at is 8,00,000 acres, out of a total cotton area of 11,00,000.

The scheme is operated in five stages of which the first two are the Government Farms at Jalgaon and Bhadgaon. The seed produced at the Jalgaon Farm is used for further multiplication in the wilt affected regions, and that at Bhadgaon Farm for the wilt free zone of Khandesh.

Stages I and II.—The selfed seed from the previous year was sown on an area of about 27 acres which gave 7,250 lbs. of cleaned seed for multiplication in Stage II during 1942-43. The quantity of seed produced from about 85 acres of tenants' holdings was 25,537 lbs., which was handed over to the Cotton Superintendent, Jalgaon, for further multiplication. All the cotton was ginned n the Farm gin and sold at a premium of Rs. 69 over Broach per *candy*.

It is stated that yields of cotton on the Bhadgaon Farm and round about are low compared with those on the Jalgaon Farm and its vicinity and that as there is no particular advantage in multiplying at Bhadgaon Farm the seed required for the wilt free zone, the possibility of doing this work on cultivators' land round about the Jalgaon Farm on suitable terms is being examined.

Stages III, IV and V.—During the year under report, 9,08,180 lbs. of *Jarila* seed were distributed by the Department over a controlled area of 41,682 acres. In addition, 30,31,990 lbs. of seed of stages IV and V were distributed through the agency of 144 approved stockists. The area covered under the scheme, during the year, is reported to be 1,85,022 acres against 26,236 acres last year. The total area under *Jarila* cotton (including natural spread) is estimated at 5,99,000 acres against 1,99,236 acres last year.

Comparative yield trials of *Jarila* and local cottons were continued during the year. *Jarila* gave a higher yield of 38 lbs. in village trials and 21 lbs. in field-scale trials over local. The ginning percentage of *Jarila* was 34.93, against 35.39 of local. Mill tests on current season's crop have shown that *Jarila* spins 20s to 24s counts with strength ranging from 74 to 82 lbs.

During the year, 2,891 *bojas* of cotton were sold by auction at a premium of Rs. 74 over Broach. *Kapas* of pure *Jarila* cotton was sold at nearly double the price of local cotton. The extra gross income realised by cultivators by growing *Jarila* is estimated at Rs. 98,25,000.

For sowing in 1942-43, the Agricultural Department has purchased 10,92,390 lbs. of seed of stages II, III and IV sufficient for 60,000 acres. The approved stockists have stocked 42,38,779 lbs. of seed of stages IV and V for multiplication and general supply over an area of 2,30,000 acres approximately. In addition to the above, it is reported that 4,19,510 lbs. of seed, sufficient for 25,000 acres, have been retained by growers and merchants. It is estimated that the seed from the controlled area will approximately cover an area of 3,15,000 areas in 1942-43.

The malpractice of mixing *Jarila* with inferior short-stapled cotton was reported to be very rampant, especially in ginning and pressing factories, and it has been suggested that section 3A of the Cotton Ginning and Pressing Factories Act, 1925, should be applied to Khandesh and Nasik districts, to penalise the mixing of *Jarila* with inferior cottons. Another suggestion made is that the Cotton Control Act should be made applicable to these areas to prevent the cultivation of any type other than *Jarila*.

(d) **Deccan Canals (Banilla) Seed Distribution Scheme.**—This scheme was sanctioned in January 1934, for a period of five years and came into operation in April 1934. In August 1939, a further extension for five years was sanctioned. At the same time the venue of seed multiplication was also changed from Kopergaon and organised on new lines in Baramati tract.

The original object of the scheme was to distribute seed of *Banilla* to enhance general cotton yields and to improve the quality of the cotton in the Deccan Canals tract in the Poona, Sholapur and Ahmednagar districts. In view, however, of the susceptibility of *Banilla* to the wilt disease, the Committee, at its meeting held in January 1942, approved of the proposal to replace *Banilla* by *Jarila*, which gives a bigger return per acre and is, at the same time, capable of resisting wilt to a great extent.

During the year under report 13,435 lbs. of *Banilla* seed were sown over an area of 550 acres in and around Sansar in the Baramati tract, the average yield of seed cotton being 800 lbs. per acre. The cotton fetched a premium of Rs. 1-8-0 to Rs. 2 per maund of *kapas* over local. The total area under *Banilla* in the tract is estimated at 6,000 acres, against 7,300 acres last year. The estimated gross extra income derived by growers of this variety is reported to be Rs. 60,000.

(e) **B.D. 8 Seed Distribution Scheme.**—This scheme is concerned with (1) the marketing of pure B.D. 8 cotton in order to secure a price commensurate with its quality, (2) the multiplication of pure seed for further extension and (3) propaganda work for increasing the production of pure B.D. 8. It was sanctioned in August 1935, for a period of three years and came into operation in December 1935; in July 1938, it was extended for a period of five years.

During the year under report, the total area under B.D. 8 cotton in Broach district (excluding Ankleswar taluka) was 13,178 acres, against 9,728 acres last year and 30,951 acres in the year before. The Agricultural Department controlled 5,617 acres for seed multiplication, including 663 acres grown with pedigree seed from the Government and Registered seed farms.

B.D. 8 cotton was ginned under departmental supervision and 1,491 bales from the controlled area were sold at a premium of Rs. 85 to Rs. 112 on Broach. Last year the premium ranged from Rs. 85 to Rs. 132 on Broach. It is reported that B.D. 8 seed cotton from the general area was sold at a premium of Rs. 5 to Rs. 15 per *bhar* (1020 lbs.) over local.

Segregates 1-2 and 1-6 were tried in the Broach tract. These are reported to compare favourably with local as regards ginning percentage and with B.D. 8 in staple quality.

(f) **Revised Jayawant and Gadag No. 1 Seed Distribution Scheme.**—This scheme, which was sanctioned in August 1935, for a period of five years, replaced five seed schemes in the Southern Division of the Bombay Province, *viz.*, the Hubli, Gadag, Athani, Haveri and Bailhongal schemes. It came into operation on the 1st June, 1936 ; in August 1940, it was extended for a period of one year and again in July 1941, for a further period of four years from 1st June, 1942. The object of the scheme is to eliminate local mixtures and to extend pure *Jayawant* and *Gadag No.* 1 cottons in the Southern Division of the Bombay Province, over an area of 9½ lakhs or acres, within a period of five years.

Jayawant Cotton.—It was proposed to cover within five years, an area of 7.75 lakhs acres in Dharwar, Belgaum and Bijapur districts and a part of Satara district ; at the end of six years, the area covered with *Jayawant* was 8,08,364 acres, (of which 6,74,415 were under pure *Jayawant*, and 133,949 under natural spread), against 705,544 acres last year. During the year under report, 94,409 acres of the reserved area were rogued and the produce was stocked separately and sold by auction. Out of 71,24,460 lbs. of seed stocked, 64,03,180 lbs. were sold for sowng purposes. The cultivators' produce was pooled, graded and sold by auction at different centres. 33,312 *docras* of cotton were sold at a premium ranging from Rs. 10 to Rs. 15 per *naga* over local. The extra profit realised by the cultivators of *Jayawant* is estimated at Rs. 9,33,320. To cover an area of 8,20,560 acres with *Jayawant* next year, it is proposed to stock 82,05,600 lbs. of seed.

*Gadag No.*1 *cotton.*—The object was to cover, within five years, an area of 1.75 lakhs acres in Dharwar district ; at the end of six years, the area covered was 1,86,753 acres. During the year, a reserved area of 29,912 acres was rogued. 15,92,000 lbs. of pure Gadag No. 1 were stocked, of which 15,64,900 lbs. were distributed for sowing over an area of 1,51,753 acres. The natural spread of this cotton is estimated at about 35,000 acres, making a total area of about 1,86,753 acres, against 1,81,480 acres in the previous year. So far, 12,844 *docras* of cotton have been graded and sold by auction at a premium ranging from Rs. 6 to Rs. 7 per *naga* over local. The extra profit realised by the cultivators from auction sales alone is estimated at Rs. 22,000, whilst that resulting from the spread of the improved variety is estimated at

Rs. 4,91,568. With a view to covering the stipulated area of 1,87,200 acres, it is proposed to stock 18,72,000 lbs. of Gadag No. 1 seed.

(g) **Scheme for maintenance of nucleus of pure seed of improved varieties of cotton.**—In pursuance of the policy of the Committee that a nucleus of seed of all approved varieties of cotton should be maintained, a scheme for the maintenance of a nucleus of each of the following seven varieties of cotton was sanctioned in August 1937, for a period of five years :—

(1) 1027 A.L.F.
(2) B. D. 8
(3) *Jarila* (Bhadgaon).
(4) *Jarila* (Jalgaon).
(5) *Jayawant.*
(6) Gadag No. 1.
(7) *Banilla.*

The total area selfed and the quantity of selfed seed of each variety produced during the year are given below :—

Name of variety.	Area Selfed.		Amount of selfed seed produced.	Remarks.
	A.	G.	lbs.	
(1) 1027 A. L. F. ..	2	23	352	Selfed larger than one acre to take full advantage of short period of boll formation.
(2) B. D. 8.	1	..	162	159 lbs. of open fertilized seed were also produced. All the seed has been supplied to the Broach B.D. 8 Seed Distribution Scheme.
(3) *Jarila* (Jalgaon) ..	1	..	300	Seed used for Jalgaon Farm.
(4) *Jarila* (Bhadgaon)	1	..	350	,, ,, ,, Bhadgaon Farm.
(5) *Banilla*	1	..	172	..
(6) *Jayawant* ..	2	5	260	Low yield due to bad weather. 140 lbs. handed over to the Superintendent, Dharwar Farm, 105 lbs. to the Cotton Overseer, Bagalkot, 15 lbs. utilised for sowing.
(7) Gadag No. 1. ..	2	..	597	160 lbs. used for sowing on 16 acres at Gadag, 300 lbs. used for multiplication at Ron, 137 lbs. used for multiplication at Devihosur Institute.

In accordance with the decision of the Committee the scheme closed down on the 31st March, 1942.

SIND.

(a) **Seed Distribution and Extension Scheme.**—This scheme was sanctioned in December 1930, for a period of three years and came into operation in April, 1931. It was extended in August 1933, for five years from the 1st April 1934, and in November 1938, a further extension for two years was sanctioned. In August 1940, it was extended for a further period of five years from the 1st April, 1941.

The main objects of the scheme are :—

(*a*) Varietal tests of improved strains—Sind American cottons.

(*b*) Trials of high quality cottons—Egyptian and imported American cottons.

(*c*) Demonstration of cotton cultivation on non-cotton growing areas on new barrage lands.

(*d*) Seed multiplication, distribution and extension work.

(*e*) Propaganda, demonstration and advisory work in connection with the extension of improved varieties of cotton and better methods of cultivation.

(*f*) Assistance to cotton growers in marketing cotton.

The work on the Right Bank mainly consists of the extension of cotton cultivation, while on the Left Bank, attention is largely devoted to seed multiplication and distribution of improved varieties of cotton and the introduction of better methods of cultivation.

During the year under report, there were 485,000 acres under improved varieties, representing 49% of the total area under cotton in Sind, against 517,000 acres in the previous year, representing 57.1% of the Sind cotton area. The total area under cotton in the newly developed cotton tracts on the Indus Right Bank, including the non-Barrage area of North Sind, was 137,000 acres, against 112,000 acres last year. 39,170 maunds of Sind *Sudhar*, 13,250 maunds of Sind N. R. and 9,300 maunds of 4F-98 were distributed during the year, against 34,700 maunds, 11,800 maunds and 8,650 maunds, respectively, in the previous year. 84,000 maunds of Sind *Sudhar*, 5,000 maunds of Sind N. R. and 7,000 maunds of 4F-98 are reported to be available for distribution in 1942-43. The estimated

average yield per acre of *kapas* of improved varieties and the relative acre cash value are reported to be as follows:

Name of improved variety.	Estimated average yield of *kapas* per acre.	Relative acre cash value.
Sind *Sudhar*	8 *maunds.*	Rs. 76
Sind N.R.	6 „	„ 33
4F-98	5½ „	„ 46–12

The extra gross income to growers of improved varieties is estimated at Rs. 26,17,500.

(b) **Financing of Seed Distribution.**—In January 1938, a scheme for the financing of seed distribution in Sind was sanctioned by the Committee for a period of three years, subject to the condition that it would not be put into operation until the rules under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, have been brought into force. The Rules in question were put into force with effect from the 18th April, 1941, but as the penal section of the Act was only partially applied, the Committee's contribution was limited to one year only from January 1942, the position to be reviewed at the end of that period.

The object of the scheme is to establish a compact block of long staple cotton in the Barrage areas free from admixture. The following table shows the area actually grown under improved varieties, for which certified seed was directly distributed through departmental agency only :—

Source of seed supply.	Area in acres sown under		
	Sind *Sudhar.*	Sind N. R.	4F-98.
Registered seed growers	3,350	1,500	1,000
General cultivation	75,000	33,300	19,800

During the year under report, 26,070 *maunds* of Sind *Sudhar*, 8,000 *maunds* of Sind N. R. and 5,300 *maunds* of 4F-98 were distributed by the Department. For the next season, 84,000 *maunds* of Sind *Sudhar*, 5,000 *maunds* of Sind N. R. 7,000 *maunds* of 4F-98 and 2,500 *maunds* of M-4 cotton seed have been made available. 24 commission agencies and 45 depots were engaged for seed distribution work, in addition to 28 departmental depots. The following table shows the general standard of purity, soundness and germination of cotton seed during 1941-42 :—

	Sind *Sudhar*.	Sind N. R.	4F-98.
Purity	97%	99.5%	96%
Soundness	72%	75%	85%
Germination	65%	70%	80%
Weight per 100 seeds	7.7 gms.	5.7 gms.	about 7.5 gms.

It is reported that owing to insufficient number of supervisors ginning and pressing, grading and despatching of seed did not receive proper attention.

(c) **Scheme for maintenance of nucleus of pure seed of improved varieties of cotton.**—In pursuance of the policy of the Committee for the maintenance of a nucleus of seed of all varieties of cotton, the spread of which has been approved by it, a nucleus scheme for the following five varieties of cotton was sanctioned in August 1937, for a period of five years :—

1. Sind N. R.
2. Sind *Sudhar*.
3. 4F-98.
4. Sea Island 2-4.
5. Boss III-16.

The scheme came into operation in April 1938. In accordance with the decision of the Committee in August 1940, the maintenance of nucleus of Sea Island 2-4 and Boss III-16 has been transferred to the scheme for the production of long staple cottons in Sind.

The following table shows the area required to be maintained under selfed

seed and that actually maintained, as well as the quantity of selfed seed proposed to be produced and the quantity actually obtained :—

Name of variety.	Area required to be maintained.		Area actually grown.		Selfed seed proposed to be produced.	Selfed seed produced. lbs.		Remarks.
	A.	G.	A.	G.	lbs.	S.F.	O.F.	
Sind N. R.	0	30	0	30	180	200	200	
Sind *Sudhar*	3	35	3	35	780	800	150	
4F-98	1	10	1	5	230	235	65	
Sea Island 2-4 & Boss III-16	0	10	0	10	50	59½	200	Grown at Cotton Research Station, Mirpurkhas.

The scheme terminated on the 31st March, 1942.

CENTRAL PROVINCES AND BERAR.

(a) **Verum Seed Distribution and Marketing Scheme.**—In November 1929, the Committee sanctioned, for a period of one year in the first instance, the Central Provinces *Verum* Seed Distribution and Extension Scheme. It started work in September 1930, and was extended annually up to the end of July 1934, when it was combined with the newly sanctioned scheme for the extension of long staple cottons in the Central Provinces. The combined scheme, known as " Scheme for Extension of Long Staple Cotton and Marketing of *Verum* Cotton in the Central Provinces and Berar " was sanctioned for five years from June 1934. At the meeting of the Committee, held in July 1938, it was extended up to the 31st May, 1941, the title being changed to " Scheme for the Extension and Marketing of V. 434 Cotton." In January 1941, a further extension up to 29th February, 1944, was sanctioned. The scheme aims at the expansion of area under V. 434 cotton in the seven *taluqs* where *Verum* has made most headway in the past, the ultimate object being to eliminate all other varieties as far as possible. During the extension period, the objective will be to raise the area in six of the seven taluqs (excluding Ellichpur) to 5 lakhs of acres.

During the year under report, the Agricultural Department distributed 34,256 *maunds* of seed through the agency of Government seed stores, *taluq*

agricultural associations and seed farmers. An area of 291,103 acres (119,728 acres under departmental spread and 171,375 acres under natural spread) was covered against 218,000 acres last year. It is reported that in addition to the above, 7,987 *maunds* of seed were distributed outside the selected *taluqs* over an area of approximately 1.16 lakhs acres. The total amount of seed distributed in the Central Provinces and Berar was thus 42,243 *maunds* and the area covered 4.1 lakhs acres. 88,876 *maunds* of pure seed have been stocked for distribution in the next season.

The total number of bales sold through the departmental pool amounted to 9,966 bales, of which 9,167 were V. 434, the special areas contributing 6,161 bales. The average premium obtained was Rs. 95-13-6 ' on ' Broach and Rs. 130-12-0 ' on ' Oomra, against Rs. 42-13-0 and Rs. 76, respectively, last year. It is estimated that the total quantity of *Verum* produced in the Province was about 1 lakh bales, against 68,500 bales last year. The total extra income derived by the growers of V. 434 is estimated at about Rs. 64 lakhs, including Rs. 45.71 lakhs by the growers of selected blocks.

It is reported that due to the rapid expansion of *Jarila* the area under V. 434 was only 2.9 lakhs acres against 3.5 lakhs acres proposed to be covered. *Jarila* is stated to have gained a footing in *taluqs* bordering on Khandesh and to have spread also in the selected blocks. The Departmental District Officers estimate the area under *Jarila* in the Province to be 2.8 lakhs acres, of which 80,934 acres are in V. 434 areas, but it is considered that the actual area was probably not less than 4 lakhs acres. The yield of *Jarila*, in favourable seasons, is said to be almost equal to V. 434 ; its performance in years of heavy rainfall, however, still remains to be seen. On account of its higher ginning percentage, *Jarila* fetched a premuim of Rs. 10 per *khandy* of *kapas* over V. 434 in Berar ; in Nimar, however, the premium it got was not so marked and there it is probably not likely to be such a strong competitor of V. 434 as in Berar. The fixation of *Jarila* as the basis of ' futures ' contracts is expected to encourage its extension. If *Jarila* does as well in the next season as in the past, V. 434, it is considered, will have to give way to it in Berar.

(*b*) **Scheme for Distribution and Marketing of Buri 107 cotton.**—This scheme was sanctioned by the Committee in July 1938, for a period of three years, and came into operation on the 1st November, 1938. In January 1941, it was extended up to the 29th February, 1944. The object of the scheme is to introduce *Buri* 107—a selection from acclimatised *Gossypium hirsutum*

developed under the Central Provinces Botanical Research Scheme—in Burhanpur Tahsil of Nimar district, where the total area under cotton is about 75,000 acres. Commencing with an area of 2,000 acres in 1938-39, the programme was to raise the area under this cotton to 10,000 acres in 1939-40 and 30,000 acres in 1940-41. During the extension period, the aim will be to raise the area to 50,000 acres and to maintain it at that figure.

During the year under report, 5,491 *maunds* of seed (83 *maunds* from Government farms, 5,194 *maunds* from Government seed stores and 214 *maunds* from the Tahsil Agricultural Association) were distributed; in addition, 1,157 *maunds* were distributed in other parts of the Province and the adjoining States. The total area covered was 34,000 acres (27,000 acres under departmental spread and 7,000 acres under natural spread). The significant achievement of the scheme is that local Buri is now practically non-existent. The gross extra return derived by growers of Buri 107 is estimated at Rs. 8·31 lakhs.

With a view to securing pure seed of *Buri* 107, a compact block of 1,842 acres was maintained; in addition seed was collected from 1,481 acres under departmental supervision and from 535 acres through *dalals*. In all, about 6,286 *maunds* of seed have been collected for distribution in the next season.

(c) **Maintenance of nucleus of pure seed of improved strains of cotton.**—This scheme for the maintenance of nucleus of pure seed for each of the cotton strains, V. 434, *Late Verum*, No. 438 and Buri 107, was sanctioned by the Committee in July 1938, for a period of five years from April 1939.

The following table shows the quantity of selfed seed proposed to be produced under the scheme and the quantity actually obtained :—

Strain.	Area selfed.	Selfed seed proposed to be produced.	Selfed seed produced.	Remarks.
	acres.	lbs.	lbs.	
V. 434.	1	200	399	Supplied to Government Farm, Akola.
Late *Verum*	1	200	323	Supplied to Government of Nepal.
No. 438.	1	200	287	Supplied to Government Farms, Khandwa and Yeotmal.
Buri 107	1	200	263	Supplied to Government Farm, Akola.

The scheme terminated on the 31st March, 1942.

MADRAS.

(a) **Co. 3 Seed Distribution Scheme.**—This scheme, which replaced the Madras Co. 2 seed distribution scheme, was sanctioned in January 1942, for a period of four years and five months. It came into operation in July 1942. Its object is to improve the present standard of Cambodia cotton in Salem district by replacing the existing Co. 1 and Co. 2 cotton strains with Co. 3. During the year, 31,079 lbs. of seed were distributed by the Department, through the agency of the Tiruchengode Marketing Society, to 343 *ryots* in 41 villages and 89 hamlets under the jurisdiction of 17 rural co-operative societies. Though sowing could not be done early in September, 1942, due to delayed rains, germination on the seed farm area of 1,250 acres was satisfactory and the condition of the crop good.

(b) **Scheme for distribution of H.1 strain in the Westerns area.**—The scheme, which was sanctioned by the Committee in July 1941, started work in July 1942, in three selected centres, *viz.*, Bellary, Adoni and Guntakal. In collaboration with the co-operative loan and sale societies at these centres, suitable villages where seed farms could be laid were selected and the necessary arrangements completed. H.1 cotton seed to cover an area of 6,000 acres has been distributed to the members of the seed farms.

(c) **Maintenance of nucleus of pure seed of improved varieties of cotton, Co. 2, H.1 and K.1.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years and came into operation in September 1938. The area selfed and the quantity of selfed seed of each variety produced during the year are given below :—

Name of strain.	Area selfed.	Quantity of selfed seed obtained.	How disposed of.
	Acres.	lbs.	
Co. 2	1.00	533	Sent to Agricultural Demonstrator, Tirupur, for sowing inner seed farm area.
H. 1	2.20	532	Reserved for sowing inner seed farm area at Hagari.
K. 1	2.00	657	Reserved for sowing the bulk area on the Agricultural Research Station, Koilpatti.

BARODA STATE.

(a) **Baroda (Navsari) Seed Storage Scheme.**—This scheme is concerned with the spread of 1027 A.L.F. in the Navsari district of the Baroda State. It was sanctioned in February 1933, for a period of five years, subject to the condition that the Baroda Government would arrange a seed multiplication area of 1,000 to 2,000 acres in that district. At the meeting of the Committee in July 1938, the scheme was extended for a further period of five years from 1st April, 1939.

During the year under report, the total area under 1027 A.L.F. was estimated at 2,52,868 acres, of which, the area controlled was 46,955 acres, the corresponding figures of the previous year being 80,000 and 34,645 acres, respectively. 29,826 lbs. of 'A' grade seed, 3,29,755 lbs. of 'B' grade seed and 2,04,945 lbs. of 'C' grade seed were distributed. It is reported that 'A' and 'B' grade areas and a large portion of 'C' grade area were very carefully examined and 10,543 acres were rejected as uncertifiable, leaving 36,762 acres of controlled and certified area.

The produce of the improved variety was ginned and baled under departmental supervision and stamped with "Agmark" before sale. To provide for some distinguishing mark for Baroda State produce, a stencil stamp of "1027 A.L.F. Baroda State Produce" was applied to the bales sold from Baroda State areas. In all, 6,940 Agmarked bales were sold at a premium of Rs. 8 to Rs. 15 per *candy*. It is reported that 1027 grown in Navsari district fetched a premium of Rs. 145 'on' Broach, against Rs. 132 last year, and a premium of Rs. 65 in the previous years. The gross extra income received by the cultivators of 1027 is estimated at Rs. 4,74,127-8-0 at the rate of Rs. 1-14-0 per acre for an area of 2,52,868 acres. To meet the demand for seed in the ensuing year, 37,47,942 lbs. have been purchased and stored.

(b) **Baroda B. D. 8 Seed Distribution Scheme.**—This scheme, which has for its object the extension of B.D. 8 cotton in Baroda District, was sanctioned in July 1938, for a period of five years and came into operation on the 1st April, 1939. Its object is to popularise B.D. 8 cotton (which is wilt-resistant and superior in quality to the local cottons) over 60,000 acres of the *Kahnam* black soil area of the Baroda district, north of the river Nerbudda.

During the year under report, 11,120 lbs. of A grade seed, 86,400 lbs. of B grade seed and 187,560 lbs. of C grade seed were stocked at four depots,

but owing to heavy rains and floods, only 12,000 acres were sown with B.D. 8, including 8,473 acres of certifiable purity. Against an expected produce of 3,815 *bhars* of seed cotton, 2,944 *bhars* were collected which gave 2,112 bales. These were sold mostly to Ahmedabad mills at Rs. 62 (Dabhoi) to Rs. 88 (Bombay) 'on.' The additional income realised by the growers of certified crop is estimated at Rs. 60,000, excluding Rs. 10,000 realised by the growers of non-certified crop. 14,640 lbs. of A grade seed, sufficient for 1,500 acres, 103,560 lbs. of B grade seed, sufficient for 12,000 acres and 286,440 lbs. of C grade seed, sufficient for 25,000 acres, have been stocked for sowing in 1942-43.

It is reported that large stocks of seed have been issued to leading cultivators in tracts growing B.D. 8, on the condition that they would store it for issue to growers in case the sowings fail for any reason. This precaution is taken to ensure the purity of the re-sown crop. As a result of the tests conducted at Dabhoi Farm, Segregate 1-6 is reported to be the most suitable strain in place of B.D. 8. It is wilt-resistant, high-ginning and ranks next to B.D. 8 in respect of premium; its spinning value is nearly the same as that of B.D. 8 though the feel is somewhat less soft. Arrangements have been made to test Segregate 1-6 on cultivators' fields.

D. N. MAHTA,
Secretary.

APPENDIX I.

BALANCE SHEET AS ON 31st MARCH, 1942.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Cotton Cess Recepts	1,45,61,009 10 6		I. A. Administration		21,95,406 13 0
Less : Refunds of cess to Burma	42,369 10 9	1,45,18,639 15 9	B. *Improvement of Cotton Marketing :—*		
Interest account :—			1. Cost of exhibits, travelling allowance of representatives on the Board of East India Cotton Association and members of Standards Sub-Committee and cost of Standards..	1,71,961 8 9	
Amount received on investments	21,71,262 4 3		2. Enquiry into cost of cotton production in India	2,71,963 8 9	4,43,925 1 6
Add : Refund of income-tax from interest ..	24,178 10 0				
	21,95,440 14 3				
Less :—					
1. Interest paid in advance at the time of purchasing Government papers (since recovered), interest on temporary overdrafts and bank's commission for collection of interest	61,984 14 3		C. *Seed Distribution and Extension Schemes :—*		
2. Interest credited to Provident Fund ..	4,886 6 2				
3. Bank's withdrawal charges	5,342 0 0		(i) *Bombay :—*		
4. Income-tax on interest on Government papers	29,905 1 6		(1) Hubli..	44,048 8 3	
			(2) Gadag	41,700 15 1	
			(3) Gadag (Supplementary) ..	20,167 11 4	
			(4) Surat	85,612 12 10	
			(5) Athani	18,086 1 7	
			(6) Khandesh (Banilla).. ..	1,65,646 15 0	
5. Brokerage for securities sold	828 10 0				
6. Provision for Sinking Fund	16,050 10 0				
	1,18,997 9 11	20,76,443 4 4	(7) Khandesh (Jarila)	87,713 8 9	
			(8) Deccan Canals (Banilla) ..	3,226 11 4	
			(9) B. D. 8	29,611 4 3	
Profit on conversion and sale of securities ..		3,47,382 12 2	(10) Revised Jayawant and Gadag No. 1.	1,90,265 11 1	
Sinking Fund Account		16,050 10 0	(11) Maintenance of nucleus of pure seed of improved varieties of cotton	9,664 6 3	
Miscellaneous Receipts		1,10,157 15 3	(12) Scheme for control of Selection 1A	3,151 9 0	
Refund from Provident Fund for contributions disallowed		3,391 1 11			
General Suspense account	..	278 8 0			
Carried over ..		1,70,72,344 3 5	Total	6,98,896 2 9	

BALANCE SHEET AS ON 31st MARCH, 1942—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,70,72,344	3	5	Brought forward ..	6,95,896	2	9			
							(*ii*) *Madras* :—						
							(1) Pay and allowance of Business Manager, Tiruppur ..	24,079	13	0			
							(2) Co.2	41,286	2	9			
							(3) H.1	3,952	2	9			
							(4) Maintenance of nucleus of pure seed of improved varieties of cotton ..	2,336	0	5			
							Total ..	71,654	2	11			
							(*iii*) *Sind* :—						
							(1) Seed Distribution	4,05,759	12	4			
							(2) Maintenance of nucleus of pure seed of improved varieties of cotton	9,999	2	8			
							(3) Financing of seed distribution	19,100	0	0			
							Total	4,34,858	15	0			
							(*iv*) *Hyderabad*	53,471	6	3			
							(*v*) *Central Provinces* :—						
							Maintenance of nucleus of pure seed of improved varieties of cotton	3,292	15	3			
							(*vi*) *Baroda* :—						
							(1) Navsari Seed Storage ..	24,309	8	2			
							(2) B. D. 8	8,828	15	7			
							Total	33,138	7	9			
							(*vii*) Lyallpur (Ginnery)	16,038	3	3			
							(*viii*) United Provinces C.402 ..	18,616	11	6			
											18,29,967	0	8
Carried over ..				1,70,72,344	3	5	Carried over ..				39,69,298	15	2

BALANCE SHEET AS ON 31ST MARCH, 1942—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,7 3 5	Brought forward ..		39,69,298 15 2
			D. *Printing and Propaganda* :—		
			(1) Publicity & Propaganda	1,56,555 15 0	
			(2) Printing & Distribution	1,07,474 13 9	
					2,64,030 12 9
			E. *Statistical Research* :—		
			(1) Studies of village consumption of Indian cotton	23,913 5 8	
			(2) Improvement of Cotton Forecast ..	30,772 9 0	
					54,685 14 8
			F. *Travelling Allowance* :—		
			Non-official Members		2,56,609 1 9
			II. *Technological Research* :—		
			1. *Technological Laboratory*—		
			A. (Capital expenditure)		
			(1) Land & Buildings	4,07,988 14 6	
			(2) Machinery	1,23,212 1 2	
			(3) Freight	7,502 2 8	
			(4) Apparatus & Equipment ..	41,668 5 7	
			(5) Machinery & Workshop ..	5,789 8 3	
			B. *Working Expenses*	26,81,568 10 9	
			(2) Provincial	1,96,963 13 0	
			(3) Development of alternative uses of Indian cottons :—		
			(*a*) Capital Expenditure ..	29,522 9 9	
			(*b*) Working Expenditure ..	36,771 14 5	
			(4) Investigation for improvement in the ginning of Indian cotton :—		
			(*i*) Capital Expenditure ..	34,072 13 9	
			(*ii*) Working Expenditure ..	5,444 1 9	
					35,70,504 15 7
			III. *Research Studentships*	2,82,446 2 4	
			Less : Refund from Mr. Taskhir Ahmad	2,439 0 0	
					2,80,007 2 4
Carried over ..		1,70,72,344 3 5			

BALANCE SHEET AS ON 31st MARCH, 1942—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,70,72,344 3 5			
			IV. AGRICULTURAL RESEARCH SCHEMES.		
			(i) *Bombay :—*		
			1.A. Surat Physiological	2,45,139 11 3	
			B. Surat Physiological Writing-up	5,814 7 8	
			2.A. Surat Bollworm	1,14,509 9 7	
			B. Surat Bollworm Propaganda	91,468 9 2	
			C. Surat Bollworm Writing-up ..	2,315 3 0	
			3.A. Dharwar Wilt	1,82,836 4 11	
			B. Dharwar Wilt Writing-up ..	10,902 10 3	
			4. Khandesh	26,573 5 0	
			5. Co-ordination of Cotton Research	1,749 7 6	
			6. Jalgaon Cotton Breeding ..	68,168 5 9	
			7. Broach Cotton Breeding ..	94,394 5 5	
			8. Small Leaf Disease Survey ..	3,938 9 6	
			9. Survey of Goghari Cotton ..	4,199 5 0	
			10. Defibration of Cotton Seeds ..	4,878 5 9	
			11. Plant Puller Propaganda ..	21,940 1 3	
			12. Breeding of Wilt Resistant Cotton for Surat Area	12,231 1 6	
			13. Model Projects for improvement of cotton cultivation, etc. ..	735 0 0	
			14. Inclusion of Northerns and Westerns in Dry Farming Research at Bijapur	6,956 15 4	
			15. Poona Wilt reeding	40,382 3 6	
			16. Improvement of Cotton Crop in Kaira District	1,285 8 0	
			17. Interspecific Hybridization at Surat	24,740 12 3	
			18. Dholleras Wagad Cotton at Virangam	23,134 0 8	
			Total	9,88,293 14 3	
			(ii) *Madras :—*		
			1. Herbaceum	1,42,466 13 1	
			2. Pempheres and Physiological ..	1,92,738 11 1	
Carried over ..		1,70,72,344 3 5	Carried over ..	3,35,205 8 2	83,95,136 14 3

BALANCE SHEET AS ON 31ST MARCH, 1942—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,70,72,344 3 5	Brought forward ..	9,88,293 14 3	
			Continued ..	3,35,205 8 2	83,95,136 14 3
			3. Fodder Cholam	19,517 9 4	
			4. Breeding of Nadam cotton ..	17,773 1 9	
			5. Improvement of Mungari cotton	20,636 7 4	
			6. Investigation of the possibilities for control of cotton stem weevil	6,165 7 6	
			7. Improvement of Cocanadas cotton	12,902 12 9	
			Total.. ..	4,12,200 14 10	
			(iii) *Punjab* :—		
			1. Botanical	6,08,822 13 3	
			2. Entomological	2,25,908 7 11	
			3. White Fly	48,721 4 1	
			4. Root Rot	71,048 10 10	
			5. Spraying Trials	9,977 0 6	
			6. Defibrating and Delinting ..	6,112 8 9	
			7. Survey of Disease of Malformation	1,730 10 6	
			8. Physiological	3,11,887 4 10	
			9. Clean-up Campaign of Spotted Bollworm	59,743 1 3	
			10. Jassid Investigation	13,581 3 6	
			11. Improvement of Punjab-American 289F	9,910 5 0	
			Total	13,67,443 6 5	
			(iv) *Central Provinces* :—		
			1. Botanical	4,93,449 9 4	
			2. Entomological	12,344 13 6	
			3. Investigation of Heliothis Obsoleta	1,672 9 9	
			4. Central Provinces and Berar Cotton Breeding	29,073 10 3	
			Total	5,36,540 10 10	
Carried over ..		1,70,72,344 3 5			

BALANCE SHEET AS ON 31ST MARCH, 1942—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,70,72,344 3 5			
			(v) United Provinces :—		
			1. Pink Bollworm	1,46,646 13 10	
			2. Rohilkhand and Bundelkhand Survey	13,061 14 4	
			3. Botanical	57,002 3 9	
			Total.. ..	2,21,710 15 11	
			(vi) Indore :—		
			1. Institute of Plant Industry ..	19,26,943 12 0	
			2. Cotton Genetics Research Scheme	69,211 6 11	
			Total.. ..	19,96,155 2 11	
			(vii) Sind :—		
			1. Physiological	2,63,945 12 10	
			2. Jassid Investigation	10,721 9 1	
			3. Black-headed Cricket	9,245 1 3	
			4. Scheme for investigation for production of long staple cotton	49,133 14 3	
			5. Bollworm Investigation and Clean-up Scheme	37,465 6 0	
			Total	3,70,511 11 5	
			(viii) Burma :—		
			1. Capital Expenditure	2,906 15 5	
			2. Cotton Improvement	47,790 3 9	
			Total	50,697 3 2	
Carried over ..		1,70,72,344 3 5	Carried over ..	59,43,553 15 9	83,95,136 14 3

BALANCE SHEET AS ON 31ST MARCH, 1942—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,70,72,344	3	5	Brought forward ..	59,43,553	15	9	83,95,136	14	3
							(*ix*) *Hyderabad:*—						
							1. Botanical	3,88,842	9	11			
							2. Cotton Survey	36,578	3	0			
							3. Pink and Spotted Bollworm ..	83,976	10	4			
							4. Improvement of Kumpta cotton	26,678	5	7			
							5. Inclusion of Northerns and Westerns in Dry Farming Scheme at Raichur	1,996	15	0			
							6. Pink and Spotted Bollworm Clean up Campaign	53,929	2	0			
							7. Improvement of cottons of the Oomras tract	5,571	0	0			
							Total	5,97,572	13	10			
							(*x*) *Bikaner :*—						
							Bengals Cotton Improvement ..	64,642	0	11			
							(*xi*) *Baroda :*—						
							1. Root Rot	87,732	9	5			
							2. Comparative Tests	4,251	5	3			
							3. Survey of Goghari Cotton ..	3,891	14	7			
							4. Plant Puller Propaganda ..	32,533	15	10			
							5. Mathio Cotton at Amreli and Jagudan	17,842	12	5			
							Total.. ..	1,46,252	9	6			
							(*xii*) *Bengal :*—						
							1. Comilla Scheme	37,263	5	9			
							2. Cultivation of Long Staple Cotton	1,775	13	0			
							Total.. ..	39,039	2	9			
							(*xiii*) *Mysore Doddahathi*	17,270	13	6			
							(*xiv*) Collection of Iran Cottons.. ..	3,121	12	0			
Carried over ..				1,70,72,344	3	5							

BALANCE SHEET AS ON 31ST MARCH, 1942—(*concld.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,70,72,344 3 5			
			(*xv*) *Baluchistan*—Co-ordination of research on Black-headed Cricket in Sind & Baluchistan	12,599 10 0	
			(*xvi*) Preliminary Scheme at Nawanagar	323 12 4	
			(*xvii*) Estimation of effects on cotton crop of the use of Plant Puller ..	4,143 12 5	
					68,28,520 7 0
			V. *Marketing Schemes.*		
			1. Grading and Marking of 1027 A. L. F. in Surat area	1,980 8 0	
			2. Punjab Cotton Marketing Survey ..	7,214 1 6	
			3. Baroda Better Marketing of 1027 A. L. F.	10,115 6 3	
			4. Extension and Marketing of V. 434	3,14,614 1 7	
			5. Distribution and Marketing of Buri 107 Cotton in Burhanpur Tahsil	16,147 2 0	
					3,50,071 3 4
			VI. *Miscellaneous Schemes :—*		
			1. Compilation of Manurial Trials ..	719 15 0	
			2. Compilation of Hand-book dealing with pests and diseases of cotton in the Empire	1,225 0 0	
					1,944 15 0
			By suspense account		5,458 12 7
			By Balance		14,91,211 15 3
GRAND TOTAL ..		1,70,72,344 3 5	GRAND TOTAL ..		1,70,72,344 3 5

PROVIDENT FUND ACCOUNT AS ON 31st MARCH, 1942.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Subscribers' contribution account	4,12,360 3 0		Advance to subscribers	79,346 9 0	
Less: Payment made to subscribers resigned	1,45,922 4 0	2,66,437 15 0	*Less:* Recoveries made up to 31-3-1942 ..	67,262 11 0	12,083 14 0
Committee's contribution account	4,03,250 4 11		Accrued interest on Government Paper up to 31-3-1942 credited to subscribers for distribution		3,584 10 8
Less: Payment made to subscribers resigned and forfeitures for Committee's contributions disallowed	1,41,124 9 8	2,62,125 11 3	Investment Fluctuation account		12,953 12 7
Lapse and Forefeiture account		7,027 9 0	By Balance		5,24,828 7 3
Net interest received on investments etc. ..		16,078 11 11			
Suspense account—Amount due to subscriber deceased—Mr. N. Sreenivas		500 0 0			
Suspense deposit of Mr. Dutt's own contribution		1,275 12 4			
Suspense receipts		5 1 0			
Total.. ..		5,53,450 12 6	Total ..		5,53,450 12 6

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1942.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1941	16,79,495 13 8			Administration of Committee (Including Improvement of Cotton Marketing, Printing, Publicity and Distribution and Travelling Allowance of Non-Official Members)		1,63,385 6 7
Sinking Fund	14,661 14 0	16,94,157 11 8				
Less—Refunds of Suspense Receipts received during 1940-41		492 5 0	16,93,665 6 8	Agricultural Research Grants-in-Aid (Including Research, Seed, Marketing and Miscellaneous Schemes)		4,77,914 1 7
Receipts under Section 12 of the the Indian Cotton Cess Act, 1923			5,92,500 12 1	Technological Research		2,31,481 15 10
Other Receipts.				Closing Balance :		
Sale of Publications, Sale of Cotton, Miscellaneous Receipts, Test Fees etc.	19,148 1 2			(Government Paper at cost). 3% Government of India Defence Bonds 1946 of the face value of Rs. 6,73,500 ..	6,73,500 0 0	
Suspense Receipts ..	278 8 0			*3½% Government of India Loan 1947-50 of the face value of Rs. 4,50,000	3,93,314 1 0	
Sinking Fund Provision for 1941-42	1,388 12 0	20,815 5 2		4½% Government of India Loan 1955-60 of the face value of Rs. 26,600	25,004 0 0	
Interest on Investments ..		64,070 11 11		6% Bombay Municipal Debentures, 1954 of the face value of Rs. 10,000	3,950 0 0	
		84,886 1 1		6% Rangoon Municipal Debentures, 1955 of the face value of Rs. 3,83,500 ..	4,15,328 2 0	
Loss : Less on Sale of 4% Karachi Port Trust Bonds, 1943		1,600 0 0	83,286 1 1		15,11,096 3 0	
				(Market value on 31st March, 1942, Rs. 15,52,640 inclusive of Rangoon Municipal Debentures taken at cost)		
				*An overdraft of Rs. 24,558-13-9 with the Imperial Bank of India has been secured against the hypothication of 3½% Government of India Loan 1947-50 of the face value of Rs. 1,50,000		
Carried over ..			23,69,452 3 10	Carried over ..	15,11,096 3 0	8,72,781 8 0

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1942—(*concld.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..			23,69,452 3 10	Brought forward ..	15,11,096 3 0	8,72,781 8 0
				Imprests :—		
				Committee's Account as certified by the Secretary including undisbursed pay .. 1,529 10 0		
				Technological Research Laboratory as certified by the Director, Technological Research Laboratory .. 500 0 0		
				Director of Agriculture, Sind 725 0 0		
				Cotton Research Botanist, Lyallpur, as certified by the Cotton Research Botanist, Lyallpur 150 0 0		
				Plant Physiologist, Punjab, as certified by the Plant Physiologist, Punjab 100 0 0		
				Geneticist and Botanist, Indore, as certified by the Geneticist and Botanist, Indore .. 300 0 0		
				Director of Agriculture, Bombay Presidency, as certified by the Director of Agriculture, Bombay Prsidency .. 1,370 0 0		
					4,674 10 0	
				Suspense (Recoverable) ..	5,458 12 7	
					15,21,229 9 7	
				Less : Overdraft Account with the Imperial Bank of India, Bombay, (against) hypothication of 3½% Government of India Loan 1947-50 of the face value of Rs. 1,50,000	24,558 13 9	
				**Total Closing Balance		14,96,670 11 10
Total ..			23,69,452 3 10	Total		23,69,452 3 10

**Includes Rs. 16,050-10-0 on account of Sinking Fund.

We have examined the above Statement of Receipts and Payments of the Indian Central Cotton Committee with the Books, Vouchers and Certified Returns of the Committee, have obtained all the information and explanations we have required and certify that to the best of our information and explanations received, the above Statement is a correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the Indian Cotton Cess Act, 1923.

(Sd.) S. B. BILLIMORIA & Co.

BOMBAY, 18*th June*, 1942. *Registered Accountants, Auditors.*

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH, 1942.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1941	5,36,672 10 3			Investments Fluctuation Account :—		
Less—Payments to subscribers who have resigned in 1940-41	5,899 12 11			Net depreciation in Market Value of Securities	21,328 14 0	
Subscribers' contributions ..	26,087 10 0	5,30,772 13 4		*Add*—Amount transferred to Lapses and Forfeitures Account being profit on Sale of 4% Government of India Loan 1960-70 of the face value of Rs. 20,000 ..	3,391 6 0	24,720 4 0
Add—Recoveries against advances	7,314 14 0	33,402 8 0		Balance :—		
		5,64,175 5 4		(Securities in Government Paper at Market Value).		
Less—Refunds to subscribers who have resigned ..	26,386 6 3			3% Government of India Defence Bonds, 1946 of the face value of Rs. 2,27,300 ..	2,24,901 10 0	
Less—Advances to subscribers	8,604 12 0	34,991 2 3		3% Government of India Loan, 1951-54 of the face value of Rs. 32,000	30,100 0 0	
		5,29,184 3 1		3½% Government of India Loan, 1947-50 of the face value of Rs. 1,20,000 ..	1,17,150 0 0	
Committee's contributions received from Indian Central Cotton Committee ..		26,087 10 0		4% Government of India Loan, 1960-70 of the face value of Rs. 12,600	12,978 0 0	
		5,55,271 13 1		2½% Government of India Loan, 1948-52 of the face value of Rs. 70,000	65,100 0 0	
Less—Payments made to subscribers who have resigned, including transfers to "Lapses and Forefeitures" Account for contributions disallowed ..		25,693 15 2		3% Government of India Loan 1949-52 of the face value of Rs. 35,000	33,315 10 0	
			5,29,577 13 11		4,80,545 4 0	
Interest received on investments	15,990 11 7			Savings Bank Account with the Imperial Bank of India, Bombay	371 10 0	
Interest received on advances to subscribers	152 8 5			Current Account with the Imperial Bank of India, Bombay	43,911 9 3	
Refund of Income-tax deducted on interest received during 1940-41	1,394 14 0	17,538 2 0				5,24,828 7 3
Less—Interest paid during the year to subscribers who have resigned :— On their own contributions	234 1 2					
Carried over ..	234 1 2	17,538 2 0	5,29,577 13 11	Carried over ..		5,49,548 11 3

PROVIDENT FUND ACCOUNT AS AT 31st MARCH, 1942—(*concld.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..	234	1	2	17,538	2	0	5,29,577	13	11	Brought forward ..				5,49,548	11	3
On Committee's contributions,	231	6	3													
Interest paid in advance at the time of purchase of Government Securities (since received)	235	5	4													
Incometax deducted from interest on investments (recoverable)	832	8	0													
Withdrawal charges for Securities sold	12	8	0													
Cost of stationery, etc. ..	34	6	0													
Bank's commission for collection of interest and cost of stamps	22	11	0	1,600	13	9										
							15,987	4	8							
Lapses and Forfeitures Account							4,028	8	1							
Suspense Receipts.																
Being excess contribution received from Mr. Verma							5	1	0							
Total ..							5,49,548	11	3	Total ..				5,49,548	11	3

Examined and found correct.

(Sd.) S. B. BILLIMORIA & CO.

Registered Accountants, Auditors.

BOMBAY, 18*th June*, 1942.

APPENDIX II.

MEMBERS OF THE INDIAN CENTRAL COTTON COMMITTEE.

(1) PRESIDENT—

Mr. P. M. Kharegat, C.I.E., I.C.S., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*.

(a) Dr. W. Burns, C.I.E., Agricultural Commissioner with the Government of India, *ex-officio*.

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS—

Madras	Mr. P. H. Rama Reddi, I.A.S., Director of Agriculture.
Bombay	Mr. W. J. Jenkins, C.I.E., I.A.S., Director of Agriculture.
United Provinces	Mr. C. Maya Das, I.A.S., Director of Agriculture.
Punjab	Mr. H. R. Stewart, C.I.E., I.A.S., Director of Agriculture.
Central Provinces and Berar	Mr. J. C. McDougall, C.I.E., I.A.S., Director of Agriculture.
Sind	Rao Bahadur K. I. Thadani, Director of Agriculture.

(3) THE DEPUTY ECONOMIC ADVISER TO THE GOVERNMENT OF INDIA, *ex-officio*.

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS—

The East India Cotton Association ..	Sir Purshotamdas Thakurdas, C.I.E., M.B.E.
The Bombay Millowners' Association ..	Sir Sorab Saklatvala, M.L.A.
The Bombay Chamber of Commerce ..	Mr. L. F. H. Goodwin.
The Indian Merchants' Chamber ..	Sir Chunilal B. Mehta. (*Vice-President.*)
The Karachi Chamber of Commerce ..	Mr. A. P. Darlow.
The Ahmedabad Millowners' Association	Mr. Chandulal P. Parikh.
The Tuticorin Chamber of Commerce ..	Mr. J. L. Hurschler.
The Upper India Chamber of Commerce ..	Captain S. R. Pocock, M.C., M.L.A.
The Empire Cotton Growing Corporation	Sir William Roberts, C.I.E.

(5) COMMERCIAL REPRESENTATIVES NOMINATED BY CENTRAL GOVERNMENT—

Central Provinces and Berar	Rao Saheb P.V. Deshmukh. Mr. Y. G. Deshpande.
Madras	Mr. J. M. Doak.
Punjab	Kanwar Raj Nath.

(6) *Bengal representative* .. .. .. Mr. Suryya Kumar Basu.

(7) CO-OPERATIVE BANKING REPRESENTATIVE—Sir Chunilal V. Mehta, K.C.S.I.

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

Madras	Rao Bahadur R. V. Ramasundaram Pillai, Mr. L. Madhava Reddi.

Bombay	Mr. S. T. More, Vacant.
United Provinces	Khan Bahadur M. Ahmad Hussain Khan, Rai Bahadur Kunwar Laxmi Raj Singh, M.L.C.
Punjab	Khan Bahadur Ch. Riasat Ali, M.L.A., Rai Saheb Ch. Surajmal, M.L.A.
Central Provinces and Berar	Rao Bahadur Sir Madhaorao Deshpande, K.B.E., Rao Bahadur Uttamrao Patil.
Sind	Mr. Roger Thomas, C.I.E.

(9) AND (10) REPRESENTATIVES OF INDIAN STATES—

Hyderabad State	Rai Saheb Kalidas Sawhney, Director, Agricultural Research.
Baroda State	Mr. R. G. Allan, C.I.E., Commissioner of Agriculture.
Gwalior State	Mr. N. M. Deshmukh, Director of Agriculture.
Rajputana and Central India States ..	Rao Bahadur V. A. Tamhane.

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN COUNCIL :—

1. Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Northern Division, Surat,
2. Mr. T. G. Rama Iyer, Director of Agriculture in Mysore, Bangalore.
3. Rao Bahadur V. Ramanatha Ayyar Avl., Cotton Specialist and Geneticist, Coimbatore.
4. Musahib-i-Khas Bahadur M. A. Rashid Khan, Home Minister, Holkar State, Representative of the Holkar State.
5. Dr. Chellaram Shewaram, Representative of the Karachi Indian Merchants' Association.
6. Dr. B. L. Sethi, Economic Botanist (Cotton & Rabi Cereals) to the Government of the United Provinces, Cawnpore.
7. The Hon'ble Mr. V. Ramdas Pantulu, President, Madras Provincial Co-operative Bank, Madras.
8. Sir Shri Ram, Representative of the Cotton Millowners of Delhi.
9. Representative of the Karachi Cotton Association Ltd.—Vacant.
10. Dewan Bahadur Sir T. Vijayaraghavacharya, K. B. E.
11. Dr. P. J. Gregory, Second Economic Botanist, Bengal.
12. Sir Theodore Gregory, Economic Adviser to the Government of India.
13. Mr. Jamalulla Hussaini, Deputy Director of Agricultural Propaganda, Nampally Station, Hyderabad (Deccan).
14. Mr. Padampat Singhania, Senior Proprietor, Messrs. Jugilal Kamlapat, Cawnpore.
15. Mr. R. G. Saraiya, O.B.E., J.P., Messrs. Naraindas Rajaram & Co., Bombay.

Agricultural Research Sub-Committee.—

I. *The President*—Mr. P. M. Kharegat (*ex-officio*),

II. *The Vice-President*—Sir Chunilal B. Mehta (*ex-officio*),

III. *The Co-operative Banking Representative*—Sir Chunilal V. Mehta (*ex-officio*),

IV. *Cotton Growers' Representatives.*—Sir William Roberts, Mr. Roger Thomas, Rao Bahadur Sir Madhaorao Deshpande,

V. *Cotton Trade Representatives.*—Sir Purshotamdas Thakurdas, Mr. Chandulal P. Parikh, Mr. J. L. Hurschler, Mr. L. F. H. Goodwin, Dr. Chellaram Shewaram.

VI. *Agricultural Officers.*—The Agricultural Commissioner with the Government of India (*ex-officio*), Mr. H. R. Stewart, Mr. W. J. Jenkins, Mr. P. H. Rama Reddi, Mr. C. Mayadas, Mr. R. G. Allan, Rao Bahadur K. I. Thadani, Rai Saheb Kalidas Sawhney, Mr. N. M. Deshmukh, Mr. J. C. McDougall, Mr. T. G. Rama Iyer, Rao Bahadur S. S. Salimath, Rao Bahadur V. A. Tamhane.

VII. *Additional Members.*—Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Chunilal V. Mehta, Mr. Mohammad Afzal, Mr. K. Ramiah, Professor R. H. Dastur, Rao Bahadur V. Ramanatha Ayyar, Dr. B. L. Sethi, Dr. R. Sankaran, Mr. S. S. Pande, Dr. V. G. Panse, Dr. B. N. Appal, Dr. P. J. Gregory, Dr. H. K. Nandi.

VIII. The Secretary.

Technological Research Sub Committee.—The President—Mr. P. M. Kharegat (*ex-officio*), The Vice-President—Sir Chunilal B. Mehta (*ex-officio*), The Agricultural Commissioner with the Government of India (*ex-officio*), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Sir Chunilal V. Mehta, Sir William Roberts, Sir Shri Ram, Mr. H. R. Stewart, Mr. W. J. Jenkins, Mr. P. H. Rama Reddi, Mr. J. C. McDougall, Mr. Chandulal P. Parikh, Mr. L. F. H. Boodwin, Capt. S. R. Pocock, Mr. J. L. Hurschler, Rao Bahadur P. V. Deshmukh, Mr. E. F. G. Gilmore, Dr. Nazir Ahmad, Rao Bahadur V. Ramanatha Ayyar, Rai Saheb Kalidas Sawhney, Mr. Y. G. Deshpande, Mr. K. Ramiah, Mr. Roger Thomas, Dr. R. Sankaran, Dr. B. L. Sethi, Dr. K. Venkataraman, Rao Bahadur Uttamrao Patil, Mr. F. F. Bignell and Mr. A. D. Walwyn (Representing the Bombay Millowners' Association), Seth Himatlal Kalidas and Seth Chinubhai Chimanlal (Representing the Ahmedabad Millowners' Association) and Mr. R. G. Saraiya and Mr. Gatulal Rangildas (Representing the East India Cotton Association, Ltd.)

Wider Markets Sub Committee.—The President (Mr. P. M. Kharegat), The Vice-President (Sir Chunilal B. Mehta), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Sir Chunilal V. Mehta, Dr. W. Burns, Sir Theodore Gregory, Mr. H. R. Steawart, Mr. W. S. Jenkins, Sir William Roberts, Mr. P. H. Rama Reddi, Mr. Chandulal P. Parikh, Rao Bahadur K. I. Thadani, Rao Saheb P. V. Deshmukh, Mr. L. F. H. Goodwin, Mr. Roger Thomas, Kanwar Raj Nath, Dr. Nazir Ahmad, Mr. R. G. Saraiya, Mr. Y. G. Deshpande, Mr. C. Maya Das, Mr. J. C. McDougall, Rai Saheb Kalidas Sawhney and Mr. V. Ramdas Pantulu.

Cotton Forecast Sub Committee.—The President (*ex-officio*), The Vice-President, the Agricultural Commissioner with the Government of India (*ex-officio*), The Deputy Economic Adviser to the Government of India, the Director of Agriculture, Bombay Province, the Director of Agriculture, Punjab, the Director of Agriculture, Madras, The Director of Agriculture, United Provinces, the Director of Agriculture, Central Provinces and Berar, the Director of Agriculture, Sind, the Director of Arriculture, H. E. H. the Nizam's Government, the Commissioner of Agriculture, Baroda, the Director of Statistics, H. E. H. the Nizam's Government, the Director of Land Records, Central Provinces and Betar, the Deputy Director of Statistics, Department of Commercial Intelligence and Statistics, the Statistical Officer, Department of Industries and Commerce, Madras, Sir Theodore Gregory, Mr. J. L. Hurschler, Mr. L. F. H. Goodwin, Sir William Roberts, Sir Chunilal V. Mehta, Mr. Roger Thomas and Dr. V. G. Panse.

Cotton Ginning and Pressing Factories Sub Committee.—The President—Mr. P. M. Kharegat, the vice-President—Sir Chunilal B. Mehta (*ex-officio*), the Co-operative Banking Representative—Sir Chunilal V. Mehta (*ex-officio*), Sir Purshotamdas Thakurdas, Sir Sorab Saklatvala, Mr. J. L. Hurschler, Sir William Roberts, Mr. W. J. Jenkins, Rao Saheb P. V. Desamukh, Dr. Chellaram Shewaram, Capt. S. R. Pocock, Mr. Chandulal P. Parikh, Mr. L. F. H. Goodwin, Mr. J. M. Doak, Mr. J. C. McDougall and Dr. Nazir Ahmad.

Standards Sub Committee.—Mr. C. P. Bramble (representing the Imperial Council of Agricultural Research), Mr. Haridas Madhavdas and Mr. Jamnadas Ramdas (Representing the East India Cotton Association, Mr. W. S. Priestley, and Mr. Kisharam Lekhraj (Representing the Karachi Cotton Association, Ltd.), Rao Bahadur Sir Madhaorao Deshpande and Mr. Sugan Chand Tapadia (Representatives of cotton growers of *Oomras* tract), Mr. Y. R. Joshi and A. J. Kapadia (Representatives of cotton growers of Broach tract), Mr. Mulchand V. Shah and Mr. Bansilal Jivanlal Desai (Representatives of cotton growers of Dholleras tract), Rao Saheb F. B. Lokshmeshwar, Mr. S. T. Patil (Representatives of cotton growers of *Kumpta* tract), Mr. H. J. Vadodaria and Mr. Vrajlalbhai Narotamdas Trivedi (Representatives of cotton growers of Mathia tract) and Mr. Roger Thomas (Representatives of the Sind and Punjab cotton growers).

APPENDIX III.

STOCKS OF INDIAN COTTON ON 31ST JANUARY, 1942, HELD BY THE MILLS AND THE TRADE IN MADRAS PROVINCE.

(In thousand bales of 400 lbs. each.)

Trade Descriptions of Cotton.	Mill stocks on 31st January.					Trade stocks on 31st January.					Total stocks on 31st January.				
	1938.	1939.	1940.	1941.	1942.	1938.	1939.	1940.	1941.	1942.	1938.	1939.	1940.	1941.	1942.
Tinnevellies	22	32	20	18	27	18	4	2	14	17	40	36	22	32	44
Salems..	15	16	4	9	10	3	8	3	2	6	18	24	7	11	16
Cambodias	46	71	33	34	66	14	17	5	21	38	60	88	38	55	104
Northerns & Westerns.	24	19	15	23	25	12	18	2	16	10	36	37	17	39	35
Cocanadas	*	1	1	1	4	12	14	8	9	19	12	15	9	10	23
Outside Cottons ..	50	27	49	56	61	..	..	..	..	4	50	27	49	56	65
Total ..	157	166	122	141	193	59	61	20	62	94	216	227	142	203	287

* Less than 500 bales.

APPENDIX IV.

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS.

(Based on returns made under the Indian Cotton Cess Act, 1923, by mills in British India, and on voluntary returns from mills in Indian States).

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

	1927-28.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	†1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.
Bombay Island ..	435,426	542,036	766,375	664,546	611,606	565,084	491,709	687,287	664,199	636,720	782,815	750,317	634,149	982,084	1,057,745
Ahmedabad	298,075	318,983	344,021	321,503	322,257	348,009	373,345	326,558	320,982	304,398	346,269	346,375	305,459	341,800	414,870
Bombay Provnice ..	894,671	1,044,925	1,300,859	1,173,659	1,132,645	1,116,297	1,063,549	1,230,616	1,189,310	1,128,744	1,353,998	1,316,313	1,172,285	1,580,079	1,764,339
Madras Province ..	194,591	204,284	211,488	214,759	260,707	292,013	278,060	312,164	365,423	412,268	422,573	480,339	507,391	525,611	594,054
United Provinces ..	170,846	182,462	234,205	235,623	256,820	273,573	277,230	292,424	317,011	299,073	288,320	356,331	349,340	381,025	427,305
Central Provinces and Berar	116,888	121,391	123,146	118,492	115,018	111,208	112,660	125,014	130,298	122,987	146,587	164,616	142,868	153,825	178,791
Bengal	82,086	84,212	99,075	91,993	102,390	103,784	107,633	101,101	98,892	79,044	92,546	90,611	111,383	135,227	125,740
The Punjab and Delhi.	45,638	54,575	64,464	73,736	89,681	80,854	71,939	83,897	89,430	93,886	94,742	133,347	165,274	171,652	179,987
Rest of British India	15,040	22,189	24,458	27,101	30,342	31,935	35,139	38,575	38,010	35,823	46,840	49,806	44,867	47,316	64,641
Total—British India..	1,519,760	1,714,038	2,057,695	1,935,363	1,987,603	2,009,664	1,946,210	2,183,791	2,228,374	2,172,725	2,445,606	2,591,863	2,493,408	2,994,735	3,334,857
Total—Indian States.*	251,589	277,540	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375
TOTAL—INDIA ..	1,771,349	1,991,578	2,373,094	2,269,359	2,346,396	2,360,924	2,336,326	2,612,132	2,677,688	2,632,785	2,999,609	3,151,065	3,050,106	3,617,147	4,025,232

* Figures for Indian States up to and including 1930-31, being based on yarn production returns, include foreign cotton also.

† From April 1937 figures for Burma have been excluded.

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES.

(Based on voluntary returns from mills in Indian States).

N.B.—Figures up to and including 1930-31, being based on yarn production, include foreign cotton also.

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1927-28.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.
Hyderabad	16,697	19,067	20,823	23,074	31,290	33,488	33,231	45,588	51,771	49,981	63,093	68,156	67,995	72,860	83,725
Mysore	44,320	39,619	46,590	43,326	49,293	50,596	47,168	51,196	50,824	53,236	55,244	53,858	67,851	65,062	74,966
Baroda	46,884	48,852	59,043	62,578	58,534	50,587	53,612	57,146	51,963	51,761	70,686	73,278	65,573	91,519	90,642
Gwalior	25,716	36,708	41,463	45,207	45,892	43,306	49,362	56,318	72,163	79,079	89,243	94,090	88,688	95,517	94,300
Indore	65,391	76,070	83,026	88,620	95,296	91,036	111,430	114,229	113,379	106,454	147,766	140,792	120,186	138,795	148,867
Kathiawar States ..				20,283	18,849	18,868	26,506	35,438	37,397	42,717	48,545	44,109	43,703	50,479	60,628
Other Indian States ..	52,581	57,224	64,454	32,558	39,382	40,209	45,197	45,735	51,462	57,767	57,119	58,444	102,702	108,180	137,247
Pondicherry				18,350	20,257	23,170	23,610	22,691	20,355	19,065	22,307	26,475			
Total—Indian States.	251,589	277,540	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375

LOOSE (UNPRESSED) INDIAN RAW COTTON RECEIVED IN SPINNING MILLS IN BRITISH INDIA.

(Based on voluntary returns furnished by mills.)

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

	1927-28.	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	‡1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.
Bombay Province ..	24,970	27,324	24,361	54,409	74,979	80,092	74,868	58,355	75,617	67,219	74,750	80,164	86,687	96,215	102,965
Madras Province ..	39,560	52,188	46,582	55,717	99,389	96,340	110,875	128,260	147,044	173,102	156,675	162,489	175,540	189,257	230,691
United Provinces ..	10,308	13,878	20,441	18,496	14,367	19,236	17,871	10,090	10,405	10,659	15,719	17,532	20,279	29,127	26,293
Central Provinces and Berar	20,861	6,924	16,243	15,771	20,743	17,462	18,382	20,544	27,502	26,321	32,860	26,980	29,052	32,589	31,178
Bengal*										90			3		
The Punjab & Delhi †	4,739	3,760	4,361	4,307	2,817	2,149	..	5,535	3,110	28,385	23,873	25,960	33,079	28,627	30,986
Rest of British India*	..	..	..	..	..	..	..	..	..	19,282	17,160	22,916	12,734	15,529	21,280
Total—British India..	100,438	104,074	111,988	148,700	211,795	215,279	221,996	217,784	263,678	325,058	321,037	336,041	357,374	391,344	443,393
Indian States* ..	..	..	..	..	..	..	..	..	..	131,149	109,003	122,078	116,962	131,657	118,660
Total—INDIA* ..	..	..	..	..	..	..	..	..	..	456,207	430,040	458,119	474,336	523,001	562,053

*Figures up to 1935-36 not complied. † Figures up to 1935-36 exclude Delhi.

‡ From 1936-37 the figures refer to consumption and not receipts and are based on returns furnished under the Indian Cotton Cess Act, 1923, by mills in British India and on voluntary returns from mills in Indian States. From April 1937 figures for Burma have been excluded.

TWENTYSECOND ANNUAL REPORT

of the

INDIAN CENTRAL COTTON COMMITTEE

for the year ended

31st AUGUST

1943

Price, Rs. 2.

CONTENTS.

PAGE.

CHAPTER I.

Introductory 1

CHAPTER II.

Progress in the Introduction of Improved Varieties of Cotton .. .. 18—38

(*i*) Bombay 21
(*ii*) Sind 25
(*iii*) Punjab 27
(*iv*) Central Provinces and Berar 28
(*v*) Madras 29
(*vi*) United Provinces 33
(*vii*) Hyderabad State 34
(*viii*) Baroda State 36
(*ix*) Rajpipla State 38

CHAPTER III.

Cotton Statistics .. .. 39—47

Indian cotton situation—1942-43. 39
Report on the staple length of Indian cotton crop. 42
Demand for various types of Indian cotton 43
Stocks 43
Indian mill consumption 44
Exports 44
Statistics of cotton pressed 44
Unpressed (loose) cotton statistics 44
Statistics of cotton ginned 45
Improvement of cotton forecasts 45
Scheme for crop estimating survey on cotton in the Central Provinces and Berar. 46
Report on the accuracy of the all-India cotton forecast 47
Publications 47

CHAPTER IV.

Cotton Marketing, Legislation and other Protective Measures .. .. 48—53

(*i*) Cotton prices 48
(*ii*) Cotton baling hoops 48
(*iii*) Coal requirements of ginning and pressing factories 49

PAGE.

(*iv*) Regulated cotton markets 50
(*v*) Agmarking 50
(*vi*) Universal standards 50
(*vii*) (*a*) Cotton Transport Act. 51
(*b*) Cotton Ginning and Pressing Factories Act 51
(*c*) Prevention of introduction of foreign cotton pests 52
(*d*) Cotton Control Acts 53

CHAPTER V.

Research .. .. 54—95

Research on Cotton Technology 54
Fundamental Research 56
Cotton Research in Provinces and States 62

(*i*) *Bombay.*—

(*a*) Broach Cotton Breeding Scheme 62
(*b*) Jalgaon Cotton Breeding Scheme 64
(*c*) Scheme for breeding wilt-resistant cottons in Surat area 64
(*d*) Scheme for improvement of Wagad cotton at Viramgam and Jagudan 65
(*e*) Scheme for improvement of cotton crop in Kaira district .. 66
(*f*) Scheme for interspecific hybridisation in cottons at Surat .. 67
(*g*) Scheme for improvement of Dharwar-American cotton 68

(*ii*) *Sind.*—

(*a*) Scheme for production of long staple cottons in Sind 69
(*b*) Scheme for Cotton Jassid Investigation 70
(*c*) Scheme for co-ordination of research on Blackheaded Cricket in Sind and Baluchistan. 71
(*d*) Scheme for bollworm investigation and clean-up campaign in Sind 72

(*iii*) *Punjab*—

(*a*) Punjab Botanical Scheme 73
(*b*) Scheme for improvement of Punjab-American 289 F/K. 25 cotton 75
(*c*) Physiological Scheme 75
(*d*) Root Rot Scheme 78
(*e*) Cotton Jassid Investigation in the Punjab 79
(*f*) Scheme for study of nutritional values in relation to milch buffaloes of fuzzy cotton seed and cotton seed cakes manufactured from such seeds in the Punjab 80

(*iv*) *Central Provinces and Berar.*—

Central Provinces and Berar Cotton Breeding Scheme 80

PAGE.

(v) *Madras.*—

(a) Pempheres Scheme 82
(b) Scheme for improvement of Mungari cotton in Madras Province. 83
(c) Scheme for Improvement of Cocanadas cotton in Madras Province 84

(vi) *United Provinces.*—

The United Provinces Botanical Scheme 86

(vii) *Bengal.*—

(a) Scheme for cultivation of long staple cotton in Bengal 87
(b) Comilla Cotton Scheme 88

(viii) *Baluchistan.*—

Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan. 88

(ix) *Hyderabad.*—

(a) Botanical Research Scheme. 89
(b) Scheme for improvement of cotton of Oomras tract in Hyderabad State 90
(c) Scheme for improvement of Kumpta cotton 91

(x) *Baroda.*—

(a) Root Rot Scheme 92
(b) Scheme for improvement of Mathio cotton at Amreli 92

(xi) *Bikaner.*—

Bengals Cotton Improvement Scheme 93

(xii) *Mysore.*—

Mysore (*Doddahathi*) Cotton Scheme 94

CHAPTER VI.

Seed Distribution and Extension Schemes .. .. 96—111

Bombay.—

(a) Surat Seed Distribution Scheme 96
(b) Scheme for Selection 1A cotton 97
(c) Jarila Seed Distribution and Extension Scheme 98
(d) Deccan Canals (Jarila) Seed Distribution Scheme 99
(e) B. D. 8 Seed Distribution Scheme 100
(f) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme .. 101
(g) Scheme for cultivation of 1027 A. L. F.cotton in Nawapur Taluka .. 101

PAGE.

Sind.—

(*a*) Seed Distribution and Extension Scheme 102
(*b*) Financing of Seed Distribution 103

Central Provinces and Berar.—

(*a*) Verum Seed Distribution and Marketing Scheme 104
(*b*) Scheme for Distribution and Marketing of Buri 107 cotton 106

Madras.—

(*a*) Co. 3 Seed Distribution Scheme 107
(*b*) Scheme for distribution of H. 1 strain in the Westerns area 107
(*c*) Maintenance of nucleus of pure seed of improved varieties of cotton Co. 2 and K. 1. 108

United Provinces.—

Scheme for distribution and extension and marketing of Perso-American cotton in Western United Provinces 109

Baroda State.—

(*a*) Baroda (Navsari) Seed Storage Scheme 109
(*b*) Baroda B. D. 8 Seed Distribution Scheme 110
(*c*) B. 9 Seed Storage Scheme 111

APPENDICES.

I. Members of the Indian Central Cotton Committee 112
II. Sub-Committees 114
III. Balance Sheet as at 31st March, 1943; statement of receipts and payments for the year ended 31st March, 1943 116
IV. Stocks of Indian cotton on 31st January, 1943, held by the mills and the trade in Madras Province 130
V. Indian raw cotton consumed in Indian mills 131

INDIAN CENTRAL COTTON COMMITTEE. ANNUAL REPORT.

CHAPTER I.

INTRODUCTORY.

THIS is the twentysecond Annual Report of the Indian Central Cotton Committee, covering the period 1st September, 1942, to 31st August, 1943. The Indian Central Cotton Committee was established by the Government of India in 1921, in pursuance of the recommendations of the Indian Cotton Committee of 1917-18. It was incorporated under the Indian Cotton Cess Act in 1923 and from that time it became an administrative body, having at its disposal funds for the improvement and development " of the growing, marketing and manufacture of cotton in India."

The funds of the Committee are derived from the cotton cess of two annas (four annas for the first three years) levied on every bale of Indian cotton exported from or consumed in mills in British India, the underlying principle being that special expenditure for the benefit of a particular industry should be borne by that industry. Of the total receipts of the Committee up to 31st March, 1943, amounting to Rs. 1,76,01,830, Rs. 1,50,12,308 represent collections from the cotton cess. As explained in the previous reports, funds are allotted by the Committee for research into cotton problems, mainly of all-India importance and for development, extension and marketing of improved varieties of cotton. The aim has always been to supplement and not supplant the work of the Agricultural Departments in the cotton growing provinces and Indian States and, though, as a matter of convenience, certain lines of demarcation have been laid down regarding the investigations which the Committee considers most appropriate for its grants, the general policy is to give assistance in the direction where it is most needed in the carrying out of a co-ordinated policy of cotton improvement. In this connection, it may be mentioned that, whilst until 1937 practically the entire expenditure on the various schemes of research and development was met by the Committee, the provincial Governments and States have since borne an increasing share of expenditure on schemes in which they are specially interested.

Under the Indian Cotton Cess Rules, members, who are not *ex-officio* members, hold office for three years and one-third of their number retire each year in rotation. The term of office of additional members appointed by the Governor General under Section 4(xi) of the Indian Cotton Cess Act is three years or such lesser period as may be specified in the notification. A list of the members constituting the Committee and the various interests they represent as on 31st August, 1943, is given in Appendix I. The composition of the Sub-Committees as on 31st August, 1943, is given in Appendix II. The functions of the various Sub-Committees have been detailed in previous Annual Reports, and it is not proposed to repeat them here.

There was no change in the administration. The term of appointment of Mr. D. N. Mahta as Secretary of the Committee was extended by the Government of India for a further period of five years with effect from the 4th October, 1942. Dr. Nazir Ahmad continued as Director of the Committee's Technological Laboratory. The receipts during the year amounted to Rs. 5,29,765 and the total expenditure to Rs. 8,62,295. The receipts and expenditure of the Committee, as well as the Balance Sheet for the year as at 31st March, 1943, are given in Appendix III. The day-to-day administration of the Committee is carried on in consultation with the Standing Finance Sub-Committee which exercises its powers under Rule 11 of the Rules under Section 16 of the Indian Cotton Cess Act, and is the principal executive body of the Committee.

The Committee learnt with deep regret of the death in England of Sir Bryce Burt, its former President and at its meeting held in January, 1943, passed a resolution of condolence placing on record its sense of deep sorrow at his death and its appreciation of the valuable services rendered by him over a period of 18 years of his close association with the Committee, first as its Secretary, then as member and finally as its President.

Sir Pheroze Kharegat (President), Sir Chunilal B. Mehta (Vice-President), Mr. W. J. Jenkins, Sir Chunilal V. Mehta and Mr. D. N. Mahta, Secretary, represented the Committee on the Board of Governors of the Institute of Plant Industry, Indore, during the financial year ending 31st March, 1943. Mr. Roger Thomas represented the Committee on the Imperial Council of Agricultural Research. Under Article 51, as amended, of the Articles of Association of the East India Cotton Association, the Committee is entitled to nominate, from amongst its growers' representatives, three persons, whether members of the Association or not, not having dealings in forward contracts,

as Directors of the Association. Rao Bahadur Sir Madhaorao Deshpande, Mr. L. Madhava Reddi and Mr. S. T. More were elected by the Committee as its representatives for the cotton year 1942-43.

To ensure that the requirements of the cotton textiles industry are (*a*) given due weight in the allocation of transport facilities, but (*b*) not so handled as to embarass Povincial Governments, Regional Transport Authorities and Railway Administrations in dealing with the general transport problem, the Government of India established a Cotton Movements Panel (afterwards changed to the Cotton Movements Committee) in Bombay with effect from September, 1942. Sir Chunilal B. Mehta, Vice-President, was appointed as the Committee's representative on the Panel. The Government of India also appointed Mr. D. N. Mahta, Secretary, as a member of the Panel. In November, 1942, the Cotton Movements Control Order was notified.

As usual, the Central Cotton Committee met twice during the year under review. At the first meeting, which was held at Bombay on the 29th and 30th January, 1943, and at which, His Excellency Sir Roger Lumley, Governor of Bombay, was present, the Committee was mainly concerned with the important question of the policy which should be followed in the matter of cotton production in India in the future. The existing position in this connection was set out in the following note prepared by the Secretary :—

" This note is intended to serve as a basis for discussion on the important question of the policy which the Indian Central Cotton Committee should follow in the matter of cotton production in India in the future. The need for careful planning well in advance cannot be over-emphasised. Agricultural research, particularly plant breeding, is necessarily slow in the production of results owing to the long period involved in the selection, fixation and large scale testing of improved varieties ; a planned production would enable concentrated application of science in the desired channel from the commencement and thus ensure that there is no avoidable waste of effort. In order to obtain a clear understanding of the scope and importance of the subject, it is desirable first to take stock of the present position.

A better balanced production of the various types of cotton grown in the country has always been one of the main aims of the Indian Central Cotton Committee. Realising from the outset, however, that the Indian mill industry is potentially the most important customer of Indian cotton, its needs have

naturally been kept in the forefront of any plan of crop improvement. From what follows, it will be apparent that considerable success has already been achieved in these directions. It will be seen also that the War, while creating several new cotton problems, has actually helped the attainment of the objects in view by accelerating the rate of progress in the extension of superior varieties of cotton.

To go back some twenty years, that is, about the time when the Indian Central Cotton Committee was first established, India produced annually over six million bales of cotton, of which roughly two-thirds was of staple length $\frac{5}{8}$" and less. About one-third of the crop was consumed by the mill industry and half-a-million bales were utilised for such domestic purposes as hand-spinning, making of quilts and mattresses, etc. The balance, consisting mainly of short staple varieties, was exported to Japan, the Continent and the United Kingdom, etc., the first two being the principal buyers. By the pre-war year of 1938-39, a considerable change had already taken place ; the actual yield that year was some 6 million bales, but cotton of staple length $\frac{5}{8}$" and below formed less than half of the total crop. The mill consumption had at the same time, gone up to 31.5 lakhs bales, and the exports to 33.7 lakhs bales. The season 1939-40, however, witnessed the loss of the Continental markets which on the average of the three pre-war years, accounted for an annual offtake of about $8\frac{1}{2}$ lakhs bales of Indian cotton. The advisability of recommending a reduction in the area under cotton, as a remedy to off-set this loss, was considered by the Committee, but, owing to the operation of several factors, no drastic action for the time being was considered necessary, as it was expected that the increased activity of the Indian mill industry to meet War requirements would most probably make up for more than half the quantity for which export markets had been lost. This expectation was not wide of the mark, as actually the consumption of Indian cotton in mills in India increased by nearly 6 lakhs bales in 1940-41. The position of Indian cotton, particularly of the short staple type, however, became serious early in the 1941-42 season when the Far-Eastern markets were also closed as a result of the entry of Japan into the War. The annual exports to Japan, on an average, used to be some 1.5 million bales, consisting mostly of the short staple varieties and the whole of this was now rendered surplus cotton for which there was no market. Various remedies were suggested to deal with the situation. In January 1942, the wider aspects of the question of

adjusting the supply of short staple cotton to probable demand were discussed by the Indian Central Cotton Committee and the following resolution was unanimously passed :—

> " In view of the necessity and urgency of avoiding any further glutting of the Indian Cotton market with short and fair staple cotton hereafter, the buyers of which have been cut off from the Indian market, owing to the present hostilities which may run for a period which cannot be estimated at present, the Indian Central Cotton Committee requests the Government of India to urge all Provincial Governments and States in India, especially those in areas where short and fair staple cotton is being grown, to reduce the existing acreage under such cotton forthwith by at least 50 per cent. As alternative to short and fair staple cotton, such other crops may be encouraged as may suit the conditions of each area, preference being given to food grains, adequate stocks and reserves of which will continue to be a matter of vital national importance for a number of years to come. To stimulate and accelerate such change, Provincial Governments and States should be urged to subsidise the same by such means as may be most effective according to local conditions in each Province and State, including the supply of free or cheap seeds and the provision of funds and facilities for the sinking of new and the repair of old wells. The Committee requests every Provincial and State Government concerned to notify the public regarding the action taken by them as early as possible—not later than 1st March next."

In order that there might be no ambiguity as to what constituted short staple cotton, the latter was defined as comprising the whole of the *Oomras* (excluding *Jarila* and Verum) and Bengals ; Comillas ; Hyderabad Westerns ; Cocanadas and Warangal ; Central India (excluding Malvi) and *Mathia.*

On the 29th January, 1942, the creation of a special fund called the " Cotton Fund " from the proceeds of the levy of an additional duty of one anna per lb. on all imported cotton, with a view to financing measures for assisting the grower of certain types of cotton which used to be exported in large quantities to the Far East prior to the outbreak of War with Japan, was announced by the Government of India. The object of this measure was not merely to steady the market by making purchases of raw cotton of the types concerned as suitable occasion arose, but also to improve the future prospects by assisting

the cultivator to change over from short staple cotton to other more useful crops, preferably food grains. At the instance of the Committee, the specifications for goods required by Government were relaxed so as to enable more Indian cotton, particularly short staple cotton, to be used in the manufacture of such articles. At the same time, a "Grow More Food" campaign was started on a country-wide scale, and the cultivator was advised to reduce the area under short staple cotton and to grow food grains in its place. These measures, together with the announcement by the Government of Bombay of their intention to stop facilities for the movement of unwanted short staple cotton to Bombay and the replacement of the Broach, *Oomras* and Bengals contracts by a new contract—Indian Cotton Contract—with fine *Jarila* $\frac{3}{4}$" staple as the basis, brought about a marked reduction in the total acreage under cotton and contributed in no small measure to the discouragement of cultivation of short staple cotton varieties. The difference, in price, between short staple cotton which was neglected and the better staple cotton for which the local demand was greater than ever, increased very considerably.

The cumulative effect of these measures is reflected in the phenomenal change in the character of the Indian cotton crop, as will be seen from the following figures (based on the third cotton forecast for 1942-43 issued on the 23rd December, 1942) of acreage under short staple varieties.

Short staple (varieties).	Third Cotton Forecast December 1942.		Percentage increase (+) or decrease (—) of Col. 2 on Col. 3.
	1942-43.	1941-42 (revised.)	
1	2	3	4
	(In thousand acres).		
Oomras (except Verum and Jarila)	2,324	5,114	—55
Bengals	1,820	2,816	—35
Comillas	148	151	..
Hyderabad Westerns	224	294	—17
Central India (excluding Malvi) ..	610	715	—15
Mathia	271	543	—50
Cocanadas and Warangal	189	174	+ 9
TOTAL—Short staple ..	5,586	9,807	—43
TOTAL—All staples ..	18,256	22,270	—18
Percentage of short staple on Total—All staples	31	44	

It will be noted that while the total acreage is down by some 18% as compared with the previous year, the reduction under short staple is as high as 43%, the largest decrease being under short staple *Oomras*, *viz.*, 27.9 lakhs acres. The absolute reduction under all *Oomras* types, however, is only 11.9 lakhs acres, the balance having been diverted to better staple varieties, mostly *Jarila*, the spread of which in the Central Provinces and Berar and Khandesh has shown a phenomenal increase during the current season. The reduction in acreage under Punjab *desi* and Sind *desi* has been over 5.7 and 1.5 lakhs acres respectively. Taking the two provinces as a whole, no appreciable increase in the acreage under Punjab-American and Sind-American is anticipated. In so far as short staple cotton is concerned, it would seem that the goal aimed at by the Committee will be nearly reached, in as much as production of such cotton during the current season is likely to be just equal to the internal demand, with only a small balance for any possible exports.

To sum up the present statistical position of Indian cotton. According to the figures compiled by the East India and Karachi Cotton Associations, the stocks of Indian cotton held by the trade (excluding spinning mills) in Bombay and Karachi on the 31st August, 1942, were 391,000 and 95,000 bales, respectively. Complete data relating to stocks held at up-country centres are not available. On the basis of the figures of production, offtake by mills and exports, the probable carryover of Indian cotton with the trade (excluding spinning mills) on the 31st August, 1942, is estimated at 25.4 lakhs bales, including 14.7 lakhs bales of short staple cotton as shown below :—

	In lakhs of bales.	
	Total.	Short staple.
Stocks held by the trades on the 31st August, 1941 (*vide* Leaflet No. 2, 1940-41)	12.0	6.9
Probable production in 1941-42	65.0	22.7
Total supply during 1941-42	77.0	29.6
Estimated purchases by mills in 1941-42	42.9	9.9
Exports in 1941-42	8.7	5.0
Total distribution	51.6	14.9
Estimated stocks held by the trade on 31st August, 1942	25.4	14.7
Increase (+) or decrease (—) as compared with the stocks on 31st August, 1941	+13.4	+7.8

There was thus an increase in trade stocks of 7.8 lakhs bales under short staple and 5.6 lakhs bales under staple length group 'over §".' The total stocks held in the country by the mills and the trade at the end of the season may be estimated at 42.5 lakhs bales, including 18.6 lakhs bales of short staple cotton, against 26.5 lakhs and 11.5 lakhs bales respectively, on the corresponding date of the previous year. The third forecast for the current season places the crop at 44.4 lakhs bales, showing a decrease of 10.5 lakhs bales or 19% on the corresponding revised estimates of the previous year. On this basis, the probable production (excluding extra-factory consumption) may be estimated at 52.6 lakhs bales (65 lakhs less 19% or 12.4 lakhs bales). The details by varieties given in the official forecasts indicate that the short staple crop in the current season will be less than that of the previous season by 8.9 lakhs bales or 39%. On this assumption, the probable production of short staple cotton during the current season may be estimated at 13.8 lakhs bales. The mill consumption of Indian cotton during the three months ending November, 1942, amounted to 9 lakhs bales, showing a decrease of 1.1 lakhs bales on the corresponding figure of the previous year. This decrease is mainly attributable to the closure of the mills in Ahmedabad during September, October and part of November, 1942. In view of the large increase in the volume of War orders, the total consumption of Indian cotton by mills during the current season may be estimated at 42 lakhs bales. Assuming that the purchases by mills would amount to the same figure, the offtake of short staple cotton may be estimated at 10.5 lakhs bales. The exports of Indian cotton would probably not exceed 4 lakhs bales, of which the share of short staple cotton may be taken at 2.5 lakhs bales. Taking the mill consumption in the current season at 42 lakhs bales, and exports at 4 lakhs bales, the stocks with the trade (excluding spinning mills) on the 31st August, 1943, may be estimated at 32.0 lakhs bales, or 6.6 lakhs bales higher than in the previous year. Half of these stocks may be expected to be of short staple varieties. It will thus be seen that the position of short staple cotton has improved considerably, production having come down to the level of internal consumption and possible exports. The emphasis now would appear to have shifted from the short staple to the medium staple varieties.

This briefly sums up the past and the present position and it is with this back-ground that the Committee has to consider the question of the policy that should be followed in the matter of cotton production in India in the

future. It would perhaps be best to divide the subject into two parts, *viz.*, (1) short range policy, that is, the policy for the duration of the War and (2) long range policy, that is, the policy that should be followed after the War.

In considering the policy that should be adopted during the War, the first question which suggests itself is whether any measures are necessary to stabilise the statistical position, and secondly to what extent the stocks should be allowed to accumulate. In this connection, it may be pointed out that although the carryover is large at present, Indian cotton position is by no means unhealthy; cotton is a much desired investment and, from what one can see, it certainly does not appear to be pressing on the market at the moment. Further, it should be remembered that the 1941-42 short staple *Oomra* crop, which constitutes no small proportion in the carryover, was of exceptionally good quality. After the War, there is bound to be a very large demand for cotton of any type, and particularly for the short staple varieties, and it may, therefore, be reasonably expected that there would be a very rapid decrease in the carryover directly the hostilities have ceased. It may be of interest to mention that Government owned or financed cotton in the U.S.A. on the 30th September, 1942, amounted to some 4,159,000 bales, as against 11,102,000 bales on the 31st January, 1941. The total stocks, that is, Government-owned and free stocks, were 12,956,000 bales on the 1st August, 1939, and 10,455,000 bales on the 1st August, 1942. The decrease in total stocks is much smaller than in Government-owned stocks, but the decrease in the Government-owned stocks shows how cotton is liked as an investment even in the U.S.A. where the prices to-day are relatively much higher than in this country. It would seem that the American prices can go down quite a lot after the War before India will have any need to fear a price drop. Nevertheless, it would appear to be a wise policy not to allow any increase, either in the proportion of the short staple varieties or in the total acreage as compared with the current season. There is some apprehension in certain quarters that the crop next year may increase owing to good prices and that short staple may possibly increase at the expense of the longer staple styles owing to the fact that, due to weather conditions in the *Oomras* tracts, short staple varieties have either fared better than the long staple ones, or the *ryots*, who almost exclusively planted the better staple seed, now believe that with short staple they would have done better. Having regard to the fact that adequate stocks of food grains are a matter of vital national importance, particularly

during the present emergency, it would seem desirable to curb, from the outset, any tendency to increase the area under cotton. The surplus from the current year's production is likely to be some 6 lakhs bales, mostly of cotton over $\frac{5}{8}$" in staple, and it may even be desirable to examine whether a portion of the acreage under such cotton should be diverted to food grains during the next season. In doing so, the following figures regarding the curtailment in acreage effected in the major cotton growing provinces and Hyderabad and Central India States will be found helpful :—

	Third Cotton Forecast, 1942-43.		
	Area (Thousand acres).		% Decrease (in area.)
	1942-43.	1941-42.	
Bombay Province (including Bombay States and Baroda)	4,338	6,402	—32
Central Provinces and Berar ..	3,167	3,610	—12
Madras	1,931	2,036	—5
Punjab (including States and North West Frontier Province)	3,072	3,527	—13
Sind (including Khairpur State) ..	768	1,003	—23
Hyderabad State	2,776	2,912	— 5
Central India	1,309	1,620	—19

Coming now to the question of the long range policy, though it is difficult to forecast with any degree of accuracy what the requirements of the various markets for cotton after the war may be, it would seem desirable to lay down the broader principles that should be followed, so that research and extension work may be directed accordingly. India at present consumes annually over 6 lakhs bales of foreign cotton, mostly of staple above 1", while the production in the country of similar cotton up to 1 1/16" in staple amounts at present

to only some 161,000 bales, and it may perhaps be well to consider whether the area under such varieties cannot be increased by the production, by hybridisation or acclimatisation, of suitable long staple varieties that would meet the requirements of the Indian mill industry for such cotton. If this could be done, it may help to ease, to some extent, the position of medium staple varieties. Some very good progress in this direction has already been made in the Madras Province where the varieties Co. 3 and Co. 4, with staple length of 1 1/32″ to 1 1/16″, are making headway in the southern districts of the province, the production in the past season being estimated at 19,000 bales. In the Punjab, too, there may possibly be further scope for increasing the area under Punjab-American 289F/K. 25 and Punjab-American 289F/43. Whatever policy is decided upon, it is of the utmost importance that the requirements of Indian mill industry, which, as has been stated above, is the best customer of Indian cotton, must be constantly kept in mind and efforts made to cater for it as fully as possible. In this connection, it may be mentioned that recently there has been a phenomenal increase in the area under *Jarila ;* it may be well at this stage to make an estimate of the extent of the total requirements of the mills for this cotton so that, if possible, the production may be regulated accordingly. The question may perhaps also be examined as to whether it is desirable that the crop in excess of the mill requirements should consist of such qualities as are least likely to come into direct competition with the rest of the cotton producing world. Yet another question is whether a maximum limit on the total acreage should be placed, say, during the next five years. These are some of the points which suggest themselves ; there may be several others which members may like to bring up in the course of discussion.

The meeting was presided over by Mr. P. M. Kharegat, C.I.E., I.C.S., and after a full dress debate the following resolution was unanimously passed :—

" While the Indian Central Cotton Committee notes with satisfaction the decrease of four million acres in the current year's cotton crop, it is apprehensive, in view of the relatively high prices for short and fair staple cotton prevailing in the current year as compared with last year, that there will be a tendency to grow more cotton of that type in the coming season at the expense of food crops, despite propaganda to the contrary. As cotton growing must be considered in relation to the growing of other crops, and having regard to the seriousness of the food situation in the country in many areas in spite of an increase of about 8 million acres under Kharif food grains alone and in order to ensure, in the interests of the cotton grower, that the prices of cotton do not again fall to unremunerative levels as a result of over-production, the Committee recommends that

(1) measures should be taken forthwith to restrict, compulsorily if feasible, the acreage under cotton in the coming season so that it does not exceed the present season's acreage. It should be ensured at the same time that the existing proportion of short to long staple is not exceeded,

(2) a suitable fair price for food grains should be guaranteed and widely notified well before sowing time so that the grower may be encouraged to expand his acreage under food crops,

(3) suitable concessions should be given as may be most effective according to local conditions in each province or state, such as the supply of seed and manure at cheap rates, reduction of land revenue and rent, etc., to encourage the production of food crops,

(4) the advisability of removing or adjusting the existing maximum prices for food grains should be examined by Government,

(5) a Central Crop Planning Board should be established together with Provincial Crop Planning Boards as early as possible to ensure planned production on an all-India basis. This Board should work in close co-operation with the Central Food Advisory Council."

The Second meeting of the year was held in July, 1943, at Bombay. In the absence of Sir Pheroze Kharegat, President, who was on deputation in the U.S.A. in connection with the United Nations Food Conference at Hot Springs, the meeting was presided over by Dr. W. Burns, C.I.E., Officiating Vice-Chairman of the Imperial Council of Agricultural Research. The principal subject considered at this meeting was that relating to the question of the desirability of re-opening trading in Hedge Contracts. It was pointed out that an organised 'futures' market had been recognised all over the world as being essential for the orderly marketing of large crops such as cotton, and the view was expressed that the elimination of the futures markets in respect of the Indian cotton crop would not be in the best interests of cotton growers unless Government were prepared to undertake the responsibility of purchasing the whole crop at fair and reasonable prices. The consensus of opinion was that the prohibition of hedge and futures contracts would not only take away what little protection the grower had but would seriously upset the whole system of distributing cotton in the country. It was pointed out that nearly 40 lakhs bales of cotton had to be marketed in a short space of time of three months, and that this could not be done effectively unless there was the usual facility of forward trading. The view was expressed further that much of the evils of speculation and excessive fluctuation would disappear if Govern-

ment were to take immediate steps to make trading in options a penal offence. After a very full discussion, the following resolution was unanimously passed :—

"In view of the fact that the bulk of Indian cotton crop has to be marketed in the short space of three months, it is considered essential that Government should immediately re-open Hedge Contracts. This will avoid undue risks and will materially benefit the grower and mill interests generally. If any safeguards are considered necessary to this end, Government may devise these in consultation with the East India Cotton Association.

The Committee suggests that the Ordinance relating to advances against commodities should be suitably modified so that the distribution and carrying of the cotton crop is not hampered."

During discussion, the question of the desirability of fixing minimum prices for cotton was raised. Attention was drawn to the present downward tendency of cotton prices and it was urged that in the interests of the growers, Government should fix equitable minimum prices for the various descriptions of cotton and that they should also be prepared to buy any cotton at the minimum prices when offered. After further discussion, the following resolution was passed by the Committee :—

"To protect the interests of the cotton grower, the Committee strongly urges that Government should fix equitable minimum prices for the different descriptions of cotton in consultation with the Indian Central Cotton Committee and that Government should be prepared to buy any cotton whenever offered to it at the minimum prices."

The financial position of the Committee was also reviewed at this meeting. A Special Sub-Committee, consisting of Dr. W. Burns, Sir Chunilal B. Mehta, Sir Purshotamdas Thakurdas, Mr. H. R. Stewart, Mr. W. J. Jenkins, Rao Bahadur Sir Madhaorao Deshpande, Rao Bahadur V. Ramanatha Ayyar and the Secretary was appointed to examine the existing schemes of the Committee to see if anything could be done to restore the prescribed minimum balance at Rs. 9 lakhs. The report of the Sub-Committee is given below :—

"The Sub-Committee met at 4 p.m. on the 19th July, 1943. The President explained that the estimated closing balance of the Committee at the end of the current financial year was likely to fall short of the prescribed minimum of Rs. 9 lakhs by some Rs. 1,28,000, assuming that, in the meantime, no new schemes or extensions of old schemes will be sanctioned from the funds of the Committee. The position at present was that whilst the Government of India had agreed to finance from the Cotton Fund some of the schemes

submitted to them by the Committee, the proposal for a lump sum grant of Rs. 2 lakhs from the Cotton Fund had not been accepted by the Commerce Department which was responsible for the administration of that Fund. In view of this, the Government of India, in sanctioning the budget of the Committee for the current year, had suggested that an examination of all the existing schemes might be undertaken to see what can be done to restore the prescribed minimum balance at Rs. 9 lakhs. The task before the Sub-Committee, therefore, was to see whether by reducing expenditure on the existing schemes sufficient savings can be effected and, if in its opinion that is not possible, to suggest other means of getting over the difficulty. It was clear from the statement of Receipts and Expenditure for the last ten years prepared by the Secretary that even before the war, the annual expenditure of the Committee exceeded its receipts by some Rs. 1,50,000 ; whilst the closing balance on the 31st March, 1933, was Rs. 29,69,854, it had come down to Rs. 11,63,862 on the 31st March, 1943. He mentioned this merely to indicate that, sooner or later, the time would have arrived when the minimum balance of Rs. 9 lakhs would have been reached and the Committee faced with precisely the same position as that which confronted it to-day. The fact that the time had come somewhat sooner than was anticipated was due to the heavy fall in receipts, particularly in cess receipts from exports, during the past two years. The gulf between expenditure and receipts had thus further widened, and the excess expenditure during the current year was going to be in the neighbourhood of Rs. 4 lakhs.

The Sub-Committee had before it a statement showing the various schemes in operation at present, and after examination of these, it is unanimously of the opinion that no appreciable savings can be expected to be obtained from this source. In arriving at this decision, it desires to point out that all the schemes of the Committee are thoroughly vetted by expert Sub-Committees from time to time, and the expenditure on them is controlled by the Provincial authorities concerned and the Secretary's office. Unless, therefore, it is decided to close down a number of useful schemes, which it hopes is not the intention, the remedy for getting over the difficulty will have to be looked for in other directions.

The Sub-Committee feels that the Committee has a legitimate claim on the Cotton Fund created from the proceeds of an additional import duty imposed on raw cotton for the purpose of financing measures for the benefit

of growers of cotton in India. In its opinion, the Committee's request for a lump sum grant of Rs. 2 lakhs from this Fund should not have been turned down. It desires to point out that the competition of foreign cottons is directly with staple Indian cottons and, if the money from the Fund were spent on the improvement and extension of such cottons, the intention of the Ordinance will be fully covered. On these grounds, the Sub-Committee is of the opinion that the Government of India should be requested to reconsider the matter and make good the deficit of Rs. 1,28,000 in the current year from the Cotton Fund in addition to meeting the cost of new schemes and extensions of old schemes sanctioned by the Committee. In this connection, it should be pointed out that the Committee has on it, in addition to all the other interests concerned, nearly 30% or more responsible Government officers most of whom are technical experts ; the technical and other schemes are thoroughly vetted by these officers before they are finally passed by the Committee. In the opinion of the Sub-Committee, therefore, no further examination of such schemes from the technical point of view is either necessary or desirable; in fact, it has always been understood that the acceptance by the Government of India of the schemes sanctioned by the Committee, in so far as the technical side is concerned, is purely a formal matter. During discussion, the view was expressed that diversion of money from the Cotton Fund for purposes other than those for which it was originally intended, *viz.*, for the benefit of the cotton grower, was not justified. The Sub-Committee recommends that it should be pointed out to the Government of India that the Committee is not in a position to make up the deficit even after effecting every possible economy in the existing schemes, and that unless assistance is given from the Cotton Fund, the Committee will be faced with the alternative of having to close down several of its very useful schemes. The Indian Central Cotton Committee is the one body which works primarily in the interests of the cotton growers of India. The work done by it during the last 20 years is well-known and universally recognised; it has enabled the Committee to attain a position which is unparalleled in the country. The Committee, therefore, has the first claim for assistance from the Cotton Fund which is primarily meant for the benefit of the cotton growers. In this connection, a suggestion was made that it would be a good gesture on the part of the Committee, at the same time while asking for assistance from the Cotton Fund, to reduce its liability in future by a re-orientation of its policy as regards financing of research and other schemes. It was argued that the Committee might

have been a little too generous in the past in meeting all the expenditure on research schemes, and it was suggested that the expenditure in future might be divided between the Provincial Governments concerned and the Committee on a 50 : 50 basis. Against this view, however, it was urged that some provinces might not be in a position to provide their share of expenditure when required and that this might result in work on many useful schemes being held up or not undertaken at all. As regards seed distribution schemes, it was pointed out that the growers in the provinces in which such schemes were in operation had derived great benefit from them, and, as bridging the gulf between the research stations and the cultivator, these were perhaps the most useful activities of the Committee. As regards research schemes, the Committee had already more or less come to the view that *omnibus* botanical schemes on which large sums of money had to be spent were no longer necessary and that, in future, it would sanction only specific schemes with definite objectives. The view was expressed also that in future the Committee should sanction schemes only after it was sure that the Government of India would make grants from the Cotton Fund for them, as it was a waste of time considering and passing schemes unless money was available for putting them into operation.

After examination of every aspect of the matter, while the Sub-Committee is unanimously agreed that the Government of India should again be requested to restore the minimum balance at Rs. 9 lakhs by requisite grants from the Cotton Fund and, at the same time, to meet from that Fund expenditure on new schemes and extensions of old schemes that may be sanctioned by the Committee, it recognises that this deals with the situation only in the present and the immediate future and that to put the finances of the Committee on a stable and sound basis, something more definite and permanent is required. The Sub-Committee accordingly recommends finally that the cotton cess, the incidence of which is two annas per bale at present, should be raised to 4 annas per bale, on the condition, however, that while the Cotton Fund is in operation the deficit in the minimum balance as well as the expenditure on any new schemes or extensions of old schemes that may be approved by the Committee shall be met from that Fund, and that the increased cess shall become operative only after the Fund referred to ceases to exist. The Sub-Committee further recommends that Mills in Indian States which at present pay no cess at all to the Committee on Indian cotton consumed by them

should fall in line with mills in British India. This will mean an additional cess income of about Rs. 86,000 per year to the Committee."

The view was expressed by practically all the interests represented on the Committee that the work of the Indian Central Cotton Committee was of such immense benefit to the cotton growers and the cotton industry in general that every effort should be made to increase its funds to enable more work to be undertaken. After a very full discussion, the report of the Special Sub-Committee was unanimously adopted.

Despite war conditions, research and other activities of the Committee continued unhampered and good progress was recorded in each branch. A brief account of the work done and the results achieved during the period under review is given in the following chapters.

CHAPTER II.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON.

The extension of the war and the consequent closing of the export outlets for short staple Indian cotton gave a great fillip to the efforts of the Committee in improving the quality of Indian cotton, and the year under review witnessed a phenomenal increase in the area under staple cotton, particularly *Jarila* in the *Oomras* tract. The area under improved cottons rose from 5,663,000 acres, or 24% of the total cotton acreage in 1938-39, to 10,382,000 acres, or 54% of the total in 1942-43. The improvement in the staple of the Indian cotton crop as a result of the introduction and extension of superior varieties of cotton will be apparent from the following table in which an attempt has been made to classify the Indian cotton crop according to varieties and staple lengths.

(Quantities are in thousand bales* of 400 lbs. each.)

Description of cotton.	Average 1922–27.	Average 1937–42.	1942–43.	%increase (+) or decrease (—) of col. 4 over col. 2.
1	2	3	4	5
Short staple—below ⅞"—				
(1) Bengals	905	1,087	587	
(2) Oomras	1,890	1,250	400	
(3) Central India	324	258	229	
(4) Broach (Part)	65	244	159	
(5) Dholleras	525	357	269	
(6) Kumpta and Upland (Part) ..	(*a*)	37	80	
(7) Bijapur and Bagalkot Jowari.	(*b*)	160	10	
(8) Westerns (Part)			54	
(9) Warangal and Cocanadas ..	49	30	30	
(10) Salems	30	12	8	
(11) Chinnapathi	39	45	1	
(12) Comillas			42	
Total Short staple — Quantity	3,827	3,480	1,869	—51
Total Short staple — % on "Total-All Staples."	70	62	40	

* Statistical bales containing 400 lbs. of cleaned (lint) cotton.
(*a*) Included under item (19) separate figures not being available.
(*b*) ,, ,, ,, (20) ,, ,, ,, ,,

Description of cotton.	Average 1922-27.	Average 1937-42.	1942-43.	%increase (+) or decrease (—) of col. 4 over col. 2.
1	2	3	4	5
Medium & Long staple—$\frac{7}{8}$" & above.—				
(13) Americans—Punjab and Sind (staple 1" and above) † ..	..	255	517	
(14) Americans—Punjab and Sind (staple below 1")	264	853	887	
(15) C. P. and Berar Verum ..	..	60	116	
(16) Hyderabad Gaorani	332	140	146	
(17) Broach (Part)	214	6	24	
(18) Surti		154	117	
(19) Kumpta and Upland (Part) ..	259	181	72	
(20) Westerns (Part)	251	52	38	
(21) White and Red Northerns ..			17	
(22) Tinnevellies (including Karungannies)	155	153	142	
(23) Cambodias	147	187	250	
(24) Jarila	..	65	423	
(25) Buri	..	11	84	
Total—Medium & Long staple. Quantity	1,622	2,117	2,833	+75
Total—Medium & Long staple. % on "Total—All Staple	30	38	60	
TOTAL—All Staples ..	5,449	5,597	4,702	—14

† Includes 'Punjab-American 289F/K. 25' Sind Sudhar (Sind-American 289F-1), and 'Punjab-American 289F/43,' and Sind American—M4.

It will be seen that the proportion of cotton of staple length $\frac{7}{8}$" and above to the total production increased from 30% in the quinquennium 1922-27 to 38% in the quinquennium 1937-42; the proportion in 1942-43 was 60% against 45% in 1941-42. The production of 'medium and long staple' cotton in 1942-43 increased by 1,211,000 bales or 75% as compared with 1922-27; under "short staple" there was a reduction of 1,958,000 bales or 51%. The production of cotton of staple length '1" and above', which was *nil* in 1922-27, amounted to 594,000 bales in 1942-43.

Improvement in quality has been accompanied by a noticeable increase in the yield per acre, as will be evident from the following table, in which two sets of figures, one based on the official crop forecasts and the other on the figures of actual crop accounted for by mill consumption, exports and extra-factory consumption, are given :—

Year (1st Sept.—31st Aug.)	Area (Thousand acres.)	Production Government estimates (Thousand bales of 400 lbs. each.)	Yield per acre (lbs.) Col. 3 / Col. 2.	Approximate (commercial) crop (Thousand bales of 400 lbs. each.)	Yield per acre calculated from approximate (commercial) crop. (lbs.) Col. 5 / Col. 2.
1	2	3	4	5	6
Average 1922-27	24,723	5,449	87	*5,954	96
,, 1927-32	24,738	5,206	84	*5,851	95
,, 1932-37	23,912	5,315	89	*6,447	108
1937-38	25,746	5,737	89	+6,370	99
1938-39	23,490	5,051	86	+6,051	103
1939-40	21,580	4,909	91	+5,884	109
1940-41	23,311	6,080	104	+7,032	121
1941-42	24,151	6,127	101	+6,949	115
Average 1937-42	23,656	5,581	94	+6,457	109
,, 1942-43	19,203	4,702	98	+5,045	105

* Calculated from mill consumption (*a*) +exports (*b*) +extra-factory consumption (*c*). Variation in stocks has not, however, been taken into account.

(*a*) Mill consumption in Burma included up to 31st March, 1937.

(*b*) Includes exports from Burma up to 1934-35.

(*c*) The new figure for extra-factory consumption, viz., 450,000 bales for the whole of India, based on enquiries conducted by the Committee, in selected areas, has been used throughout.

+ Best estimate of the crop as arrived at by the Indian Central Cotton Committee in connection with the annual post-mortem examination of all-India cotton forecasts.

From the second set of figures given in column 6, it will be seen that the average yield per acre rose from 96 lbs. in the quinquennium 1922-27 to 109 lbs. in the quinquennium 1937-42. The average yield in 1942-43 was 105 lbs. per acre against 109 lbs. in 1941-42.

Although exact data regarding the total additional benefit derived by the cultivators by growing improved types of cotton are not available, there is little doubt that the gain has been considerable. In 1942-43 according to the figures furnished by the provincial and state Departments of Agriculture, the gross extra income realised by the grower of certain improved varieties of cotton, covering an area of 19.8 lakhs acres, amounted to Rs. 1.77 crores. This works out to Rs. 9 per acre on the average, and on this basis, the total

increased income, accrued to the cultivators in 1942-43, by growing improved cottons on an area of 10,382,000 acres may be estimated at about 9.3 crores of rupees. Steps are now being taken to increase the production of cotton of staple length over 1", of which over six lakhs bales are imported annually from abroad.

The progress made in the introduction of improved varieties of cotton in the various provinces and states of India as a result of the joint efforts of the Indian Central Cotton Committee and the provincial and State Departments of Agriculture is summarised in the following paragraphs.

BOMBAY.

The total estimated area under cotton in Bombay Province during the year 1942-43 was 3,858,131 acres including the acreage (1,266,916 acres) for Indian States.

Broach tract.—During the year, the Agricultural Department controlled 30,731 acres including 757 acres grown with Surat Farm pedigree seed. Besides, the Department controlled 1,272 acres of new type of seed *viz.*, 'Suyog'; thus making a total controlled area of 32,003 acres. There is a slight increase in the controlled area during the year compared with that of the previous year due to the inclusion of the Nawapur Peta and a part of Nandurbar taluka of the West Khandesh District in the Surat protected area.

The Department purchased in all 16,53,696 lbs. of seed of which 11,560 lbs. were the produce of the Surat Farm. Out of the above stock, 11,36,099 lbs. were distributed in the District through 23 depots in the interior and 4,50,840 lbs. were supplied to Rajpipla and other States. 50,537 lbs. were distributed directly by the Hansot Co-operative Cotton Sale Society to its members. Thus the total seed distributed was 16,37,467 lbs., and the remaining quantity of seed was disposed of locally.

The amended Cotton Transport Act of 1923, restricting the transport of seed-cotton and cotton seed from the North of Tapti into Surat Area, remained in force during the year.

The Cotton Control Act of 1935, prohibiting the growing and trading in Goghari cotton was extended for a further period of one year in the area lying south of River Nerbudda.

Under the scheme for Grading and Marking of 1027 A.L.F. and 'Suyog' cotton (under the Grading and Marking Act of 1937) in Surat District, 4,606 bales of 1027 A.L.F. and 332 bales of 'Suyog' were agmarked. Of the agmarked bales, 2,754 of 1027 A.L.F. and 250 of 'Suyog' were sold at premiums varying from Rs. 10 to Rs. 25 for 1027 A.L.F. and Rs. 13 to Rs. 20 for 'Suyog' over local. As there was no trading in the local market since 17-5-1943, 1,852 bales of 1027 A.L.F. and 82 bales of 'Suyog' remained unsold. The position of 1027 A.L.F. variety remains almost the same as last year so far as its future spread, premium, marketing etc. are concerned.

Khandesh-Jarila—*Jarila* cotton which has been introduced for general cultivation in Khandesh is superior to local or *Banilla* in staple and is highly wilt-resistant. Its yield and ginning outturn are equal to those of the local type. It is suited to the conditions in Khandesh and is much appreciated both by the cultivator and the trade. The year under report is the sixth year of the scheme financed jointly by the Indian Central Cotton Committee and the Government of Bombay, for multiplication and distribution of seed of this variety. During the year 1942-43, 10,22,840 lbs. of *Jarila* cotton seed stocked by the Department and 43,77,100 lbs. stocked by the approved Co-operative Organizations, were distributed in the division, the area covered being about 3,00,000 acres. Out of this, an area of 94,717 acres under stages III, IV and V was organised for multiplication. In addition an area of about 178 acres was grown under this variety on Jalgaon and Bhadgaon Farms under stages I and II.

The total area under *Jarila* including natural spread, is estimated at about 7,71,000 acres during the year out of the total area of 8,89,042 acres in this division. It is estimated that in 1943-44, the area under *Jarila* will be about 95% of the *Oomras* area. Out of the pure seed produced on Government Farms and on the controlled areas, 74,29,500 lbs. of *Jarila* seed have been stocked by the Department, Co-operative Banks, Societies and Taluka Development Associations for distribution in the 1943-44 season. The production of *Jarila* including natural spread, is estimated at 1,54,000 bales or approximately on an average 80 lbs. of lint per acre. During the year under report, demand for *Jarila* cotton seed continued to be as great as before and cultivators realized high premiums for *kapas* as well as for lint.

A notable feature of the year is the application of Cotton Ginning and Pressing Factories Act, 1925, to the Khandesh tract. The provisions of this

Act prohibit the admixture of *Jarila* cotton with other cottons. It is gratifying to note that the New Indian Cotton Contract is now based on Khandesh Fine *Jarila* of staple length of $\frac{3}{4}$ of an inch. Another outstanding feature of the year is that the Government of Bombay have sanctioned a sum of Rs. 37, 632 for a period of 3 years for the organization of Co-operative Cotton Sale Societies and for the marketing and 'Agmarking' of pure *Jarila* cotton in the East Khandesh Districts. Eight such societies were organised during the year and seven more are soon to be added. A similar scheme for West Khandesh and Nasik District has been recently sanctioned by the Government.

There was no controlled area under *Banilla* cotton during the year and this variety is now very much on the decline.

Sholapur District.—The monsoon started at the right time, but further rainfall was neither adequate nor timely. Due to shortage of water in the wells, stopping of pre-seasonal canal watering to cotton and the "Grow More Food Crop" campaign, the area under cotton crop contracted very much. The total cotton area was thus 12,314 acres only during the year under report. Out of this, 2,068 acres were under irrigated *Jarila*, 562 acres under irrigated *Banilla* and 9,684 acres under local cotton.

Satara District.—Jayawant cotton is grown in the Walva and Tasgaon talukas of the Satara district, where 13,860 lbs. of Jayawant cotton seed, sufficient for about 3,300 acres, were supplied to the cultivators. The natural spread was estimated at 400 acres during the year 1942-43 bringing the total area under *Jayawant* cotton in the district to about 3,700 acres. The premium obtained for Jayawant cotton in the Sangli market over the local cotton ranged from Rs. 25 to Rs. 30 per cart. Reduction in cotton area in the Satara district is due to the increased area under food crops.

Kumpta-Dharwar Tract.—The work of extending the two improved varieties of cotton, *viz.*, *Jayawant* and Gadag No. 1 was carried out on an extensive scale in 13 centres through the approved agents and the Hubli, Gadag, Naregal, Annigeri, Nargund, Bagalkot and Bijapur Co-operative Cotton Sale Societies as well as through the Sale Shop at Haveri with the aid of funds provided by the Indian Central Cotton Committee.

The total reserved area organized for multiplying pure pedigree seed of *Jayawant* cotton at different centres was 1,38,921 acres as against 96,371 acres in the previous year and that of Gadag No. 1 cotton 25,895 acres against

29,928 acres in 1941-42. The quantity of seed secured and stocked so far by the approved agents and Co-operative bodies from these reserved areas is about 88,94,900 lbs. of *Jayawant* and 16,52,800 lbs. of Gadag No. 1—sufficient to cover 8,89,490 and 1,65,280 acres, respectively, during 1943-44. In addition some seed is stocked by the cultivators themselves from their crop.

For distribution of the general pedigree seed stocked by the approved agents and the Co-operative bodies, a sufficient number of seed depots were opened in the interior of the tract at several places in each centre. The general area under pure *Jayawant* was 4,62,113 acres against 5,78,044 acres last year and that under pure Gadag No. 1 was 1,29,495 acres against 1,21,825 acres in the previous year. The total area under *Jayawant* and Gadag No. 1 was 6,01,034 acres and 1,55,390 acres against 6,74,415 and 1,51,753 acres respectively last year. Besides, an area of about 1,75,000 acres under *Jayawant* and about 50,000 acres under Gadag No. 1 was covered by natural spread, making in all 7,76,034 acres under *Jayawant* and 2,05,390 acres under Gadag No. 1 during the year under report. The estimated yield of *Jayawant* cotton was about 70,000 bales aganist 80,000 bales and that of Gadag No. 1 was 10,000 bales against 15,000 bales in the previous year. Due to intensive propaganda to grow more food crops, the area under cotton was reduced whilst the low yield on the average was due to the poor crop in famine stricken areas.

A premium of Rs. 15 per *nag* (1344 lbs.) of seed-cotton in the case of *Jayawant* cotton and Rs. 25 per *nag* in the case of Gadag No. 1 was obtained in auction sale over local cotton sold in the bazaar. Even in private sales, *Jayawant* cotton fetched Rs. 9 to Rs. 10 more per *nag* than the prevailing prices for *Kumpta* cotton. Similarly Gadag No. 1 cotton fetched Rs. 15 more per *nag* than the local rates for Dharwar-American cotton. The extra profit secured to the cultivators of improved cotton is, therefore, Rs. 13,00,000 during this year as against Rs. 12,30,000 in the previous year. Though the average yield was less, the cotton growers were benefitted to some extent due to the high prices for cotton.

The introduction of the marketing of pure *Jayawant* and Gadag No. 1 cottons under Agmark is the outstanding feature of the revised and extended scheme. Vigorous propaganda was made to induce the cotton buyers at Hubli, Bailhongal, Bijapur and Gadag in connection with Agmarking the improved cottons. During the year under report 6,566 bales of *Jayawant* cotton and 75 bales of Gadag No. 1 cotton were pressed under Agmark in the

above mentioned four markets. Besides, a good deal of cotton, purchased by the up-country mills, was ginned under the supervision of the Cotton Staff and was taken in loose condition due to the heavy pressing charges. Intensive propaganda was, however, carried on among the mill-owners. It is emphasised here that the success of the Agmark scheme for cotton depends upon the demand for Agmarked bales from the mill-owners. The object of affixing Agmark labels on the cotton bales is to ensure the purity of the improved cotton to the consumers. If the purity of improved cotton is guaranteed, adequate premium is quite essential, but due price was not paid for Agmarked bales during the season.

SIND.

1. *The total area under cotton in the Province.*—The area under cotton in Sind during the year 1942-43 was 758,436 acres against 990,000 acres in the previous year. The decrease was largely due to the loss of foreign markets, the Hur menace, and the "Grow More Food Campaign" launched by the Provincial Government.

2. (*a*) *Area under improved varieties.*—The following statement indicates the different varieties and strains of cotton grown during the year and the acreage covered by each :—

A.—*Sind American*—			
1. Sind Sudhar	4,30,000		
2. 289F types including M4 ..	2,16,585		
3. Sind American 98	28,000		
4. Sind American 4F	12,000		
		6,86,585	
B.—*Sind Desi*—			
1. W. N. 27 or Sind N.R.	39,000		
2. Ordinary Sind Desi (Mixture) ..	32,851		
		71,851	
Total		7,58,436	

(*b*) *Short history of the improved varieties.*—

A.—Sind Americans.—There are three improved strains of this variety which are widely cultivated in different parts of the province.

(*i*) *Sind Sudhar* (G. *hirsutum* Linn).—This improved strain occupied an area of 4,30,000 acres. It is a selection from the Punjab 289F imported into Sind in 1924, and is now the standard American cotton in lower and East Sind. This variety is chiefly grown in the Tharparkar and Hyderabad Districts. It possesses a staple length of one inch, gins 29 to 30% and spins 45 H.S.W.C. It gives a good yield under widely varied conditions. The Department distributed 1,34,000 maunds of pure rogued seed of this strain during the year 1942-43.

(*ii*) *Sind American* 98 (G. *hirsutum* Linn).—This strain covered an area of 28,000 acres compared to 50,000 acres in 1941-42. It was evolved by selection from ordinary 4F cotton originally imported from the Punjab. It has a staple of $\frac{7}{8}$", ginning outturn of 33% and a spinning value of 35 H.S.W.C. The Department distributed 8,000 maunds of pure seed of this strain during 1942-43. This has been found to be a more suitable type for cultivation in the newly opened areas of the Right Bank of the Indus and is grown in the districts of Dadu, Larkana and Upper Sind Frontier.

(*iii*) *M4* (G. *hirsutum* Linn.)—This strain has been evolved recently from N.T. 21 Bulk. It has been under trial for some time and has been found suitable for growing in Eastern Sind. It is becoming very popular on the Right Bank too and is likely to replace S.A. 98 on account of its earliness It is earlier than S.A. 98 by about 4 weeks and therefore escapes damage by frost which occurs sometimes very early on the Right Bank. It possesses a staple of 27/32", a ginning outturn of 33% and spins 39 H.S.W.C. There is increasing demand for the seed of this cotton from *Zamindars* all over the province. The Department distributed 4,500 maunds of seed of this variety to certified growers during 1942-43.

More recently a strain known as M 116 has been evolved and is under test at different places during the current cotton season. It has yielded 12-14% more than M4. It is equal in spinning capacity to M4 but is a better ginner.

B.—*Sind Desi Cotton.*—Sind *Desi* cotton has a special market on account of its rough and bright white lint, which is used for mixing with wool. Its cultivation is confined to central Sind and it is grown chiefly in the Nawabshah district, Halla taluka of Hyderabad district and Sanghar taluka of Tharparkar district.

Sind N.R. or 27 W.N. (*Gossypium Arboreum* var. *neglectum* forma *Bengalensis*) is an improved *Desi* strain evolved by the Sind Agricultural

Department by selection in local *Desi* Bulk. It gives about 16 to 20% higher yield than the ordinary Sind *Desi*. It has a staple of $\frac{5}{8}$", a ginning outturn of 40% and spins 6 H.S.W.C. The Department distributed 12,000 maunds of pure seed of Sind N. R. for sowing during 1942-43.

3. *Quantity of seed of each improved variety controlled and distributed by the Sind Agricultural Department.*—

(1) *Certified Sind Sudhar seed.*—		
Sold departmentally	84,000	maunds.
Sold by factories	50,000	,,
(2) *Certified M4 seed.*—		
Sold departmentally	2,500	,,
Sold by factories	2,000	,,
(3) *Certified S.A. 98 seed.*—		
Sold departmentally	7,000	,,
Sold by factories	1,000	,,
(4) *Certified Sind N.R. seed.*—		
Sold departmentally	5,000	maunds.
Sold by factories	7,000	,,
Total ..	1,58,500	,,

PUNJAB.

The total area in the British districts was 2,319,567 acres which is 17% and 10% less than the actual area of last year and the decennial average respectively. Of the total area under cotton, Punjab-American varieties occupied 1,584,519 acres and the short staple *desi* varieties 7,35,048 acres. Medium and long staple American cottons thus constituted 68.31% of the total Punjab cotton crop, the highest proportion ever yet attained. The total baled crop according to press-returns was 10,90,345 bales of 400 lbs. each in the previous year.

Punjab Desi Cottons.—The campaign for the reduction of area under short staple *desi* cottons had a very salutary effect, a decrease of about 41% having been effected in the area of such cottons over the figures of last year. Of the three improved varieties under large scale distribution in different ecological regions, namely, 39 Mollisoni, M.60A2 and 119 Sanguineum, the first two

together occupied an area of 446,000 acres, which is roughly 61% of the total area under *desi* cottons in the Province.

Punjab-American cottons—Though the medium stapled variety 4F, was still the most extensively cultivated cotton, covering an area of roughly 6,55,000 acres, the recently introduced long stapled varieties *viz.*, 289F/43, 289F/K. 25 and L.S.S. continued to increase in popularity in different tracts of the Province. The total area under these improved varieties was estimated at 894,060 acres during the year under review as compared to 684,800 acres in the previous year. On this basis, these long-stapled cottons represented 56.4 per cent of the total Punjab American crop. The estimated acreage under each of the commercial American varieties during 1942-43 was as follows :—

4F	655,290 acres.
L.S.S.	414,190 ,,
289F/43	200,090 ,,
289F/K. 25	279,780 ,,
289F and 289F/K. 23.. ..	3,030 ,,

In addition to the above, a new long stapled, high yielding and high ginning variety, *viz.*, 124F, is spreading on its own merits in the districts of Multan, Montgomery, Muzaffargarh and Dera Ghazi Khan.

A special feature of the year was the prevalence of very high prices for American cottons as compared to those of *desi*, the difference in the sale rate of the two being of the order of Rs. 15 to Rs. 20 per maund of *kapas* in the later part of the season.

1,10,995 maunds of cotton seed of improved varieties (*Desi* 8,955 maunds and American 1,02,040 maunds) were sold by the Agricultural Department to cultivators during the year.

CENTRAL PROVINCES AND BERAR.

The total area under cotton in the Central Provinces and Berar during the year 1942-43 was 31.8 lakhs acres.

Verum 434.—The area under Verum 434 was 6.62 lakhs acres as against 4.10 lakhs acres in the previous year. This strain possesses a fine strong staple, about $\frac{7}{8}$" in length and is capable of spinning up to 31's highest standard warp counts. The average premium obtained during the season 1942-43

was Rs. 37-8 per *khandi* of lint on *Jarila*. Over 60,624 maunds of seed were distributed for sowing purposes through departmental, co-operative and other agencies.

Buri 107.—The total area under this variety in the different parts of the province was 1,55 lakh acres out of which nearly ½ lakh acres were grown in the Burhanpur *tahsil*, where a seed distribution scheme financed by the Indian Central Cotton Committee is in progress. This strain possesses a fine staple about 1″ in length and is capable of spinning up to 40's highest standard warp counts. The average rates obtained at Burhanpur for *desi* and Buri were Rs. 14 and Rs. 20, respectively, per maund of *kapas*. The total quantity of seed distributed in the *tahsil* through the Government seed depot and *Tahsil* Agricultural Association amounted to 3,296 maunds. In addition, 2,790 maunds of seed were supplied to other parts of the province and adjoining states.

MADRAS.

The total area under cotton in the Madras Presidency during 1942-43 according to the final forecast report issued in April 1943 was 2,171,800 acres as against 2,541,400 acres in the previous year.

A. Cambodia cotton.—The total area under Cambodia during the year was 551,900 acres of which 328,412 acres were under improved strains (*vide* Table I). This works out to 59.5% of the total area under Cambodia cotton as against 52.1% recorded in the previous year. The largest concentration of the strains was in Coimbatore and Ramnad districts. The demand for the seeds was met by arranging seed farms, which were run by the Agricultural Department or by the Tiruppur Co-operative Sales Society. In both cases the crop was grown and ginned under expert supervision. The seeds were purchased, after testing their germination capacity, at a premium from the seed farm growers and then sold to farmers in sealed bags. Strains Co. 3 and Co. 4 were concentrated in Salem and Ramnad districts respectively. In the former region, a scheme financed by the Indian Central Cotton Committee for the multiplication and distribution of Co. 3 has been in operation.

TABLE I.

Cambodia cotton—Total area 551,900 acres.

Name of district.	Name of the strain.	Seed of improved strains distributed by		Total area under improved strains in acres.
		Department. lbs.	Private Agency. lbs.	
Coimbatore	Co. 2	284,216	Not known.	181,574
Salem		84,294*	do.	23,282
Madura		79,447	do.	43,440
Trichinopoly		25,647	do.	7,425
South Arcot		15,891	do.	11,679
Tinnevelly		526	do.	2,750
Ramnad		4,214	do.	1,557
North Arcot		2,511	do.	1,294
Cuddapah		427	do.	188
Anantapur		480	5,330	597
Malabar		30	10,780	1,000
Other districts		520	Not known.	37
Total ..		498,203	..	274,823
Ramnad	Co. 3.	490	Not known.	2,550
South Arcot		23	do.	250
Salem		..	do.	2,440
Tinnevelly		1,772	2,480	215
Other districts		212	Not known.	17
Total ..		2,497	..	5,472
Ramnad	Co. 4.	58,354	Not known.	19,747
South Arcot		26,172	do.	4,406
Tinnevelly		18,729	31,640	705
Other districts		3,216	Not known.	333
Total ..		106,471	..	25,191
Coimbatore	920	59,534	Not known.	14,210
Tinnevelly		443	do.	100
Other districts		3,914	do.	363
Total ..		63,918	..	14,673
Coimbatore	x4463	23,809	Not known.	8,248
Other districts		98	do.	5
Total ..		23,907	..	8,253
GRAND TOTAL ..		694,996	..	328,412

* Includes Co. 3.

Amongst the several strains Co. 2 occupies the largest area as in the past. Strains Co. 4 and Co. 3 are rapidly replacing Co. 2 in the districts of Ramnad, South Arcot and Salem, while x4463 has to a certain extent replaced Co. 2 in Coimbatore district. Co. 3 and Co. 4 are getting popular with growers on account of their earliness, their suitability for sowing in summer and their getting higher premia for their lint.

B. Karunganni cotton.—The total area under Karunganni and Tinnies cottons is 529,600 acres of which 280,000 acres were sown to improved strains. This works out to 53% of the total area which is an improvement over that of last year when 27.3% of the total area was under improved strains. K. 1 was the main strain under distribution.

TABLE II.

Karunganni cotton.—Total area 529,600 acres.

Name of district.	Name of the strain.	Seeds of improved strains distributed by		Total area under improved strains in acres.
		Department, lbs.	Private Agency, lbs.	
Tinnevelly	K. 1.	272,816	86,000	115,250
Ramnad		58,267	Not known.	67,166
Coimbatore		80,271	do.	76,220
Madura		20,848	do.	14,300
Trichinopoly		3,287	do.	577
Total ..		435,489	..	273,513
Ramnad	A. 10.	..	..	6,000
GRAND TOTAL ..		435,489	..	279,513

C. Northerns.—The total area under this cotton was 175,000 acres of which 102,280 acres were under improved strains (*vide* Table III). The area under improved strains during the previous year was only 72,730 acres. Both the strains N. 14 and H. 1 under distribution have spread to a greater extent during the year.

TABLE III.

Northerns tract.—Total area 175,000 acres.

Name of district.	Name of the strain.	Seeds of improved strains distributed by		Total area under improved strains in acres.
		Department. lbs.	Private Agency. lbs.	
Kurnool	N. 14	109,351	Not known.	66,200
,, ...	N. 23	700	do.	510
Kurnool	H. 1.	2,336	do.	3,030
Cuddapah	H. 1.	1,300	do.	32,540
Total ..		3,636	..	35,570
GRAND TOTAL ..		113,687	..	104,280

D. Westerns.—The total area under this cotton was 727,000 acres against 871,000 acres in the previous year. The area under the improved strain is 243,328 acres as against 275,900 acres of last year. The reduction is due to the failure of rains in portions of Bellary and Anantapur districts.

TABLE IV.

Westerns tract.—Total area 727,000 acres.

Name of district.	Name of the strain.	Seeds of improved strains distributed by		Total area under improved strains in acres.
		Department. lbs.	Private Agency. lbs.	
Bellary	H. 1.	339,873	1,495,280	149,528
Anantapur		56,850	875,000	93,800
Total ..		396,723	2,370,280	243,328

E. Cocanadas.—The total area under this cotton was 123,400 acres, of which only 178 acres were sown to the improved strain—X20. For want of suitable seed multiplication and distribution arrangements, the strain has not spread further.

UNITED PROVINCES.

Sowings of cotton generally commenced in time. The rainfall during the year was characterised by continuous heavy showers in the months of July and August with comparatively dry weather after the first week of September. Considerable damage to the crop due to heavy rains was reported from a number of districts, specially in the Western Circle. Pickings of cotton, which commenced in the first week of October, were later by 10 days than the normal period. Slight damage to the Perso-American crop due to Leaf-Roller, Stem-Borer and Pink Boll Worm was reported from the areas growing this variety. In some areas Perso-American also showed symptoms of reddening of leaf etc., resulting in low yields. The quality of the lint and the maturity of seed are reported to be fairly satisfactory. Taken as a whole the outturn is roughly estimated at 69 per cent of the normal. The total area under cotton in the province during 1942-43 amounted to 309,161 acres against 428,620 acres (revised) last year, showing a decrease of 119,459 acres or 27.9 per cent. The total outturn of the crop was 90,749 bales compared with 105,445 bales (revised) last year, showing a decrease of 14,696 bales or 13.9 per cent. The decrease in the area of the crop this year is apparently due to the "Grow More Food" campaign launched by the Government.

The bulk of the crop in the United Provinces comprises of "U.P. Bengals," but interest is now being taken in the development of long-staple cotton of the Upland American types. As a result of wide-spread trials of improved strains all over the province for a number of years, C.520 a *desi* selection, and Perso-American, an American type have been found suitable for the cotton growing areas in the United Provinces. They are, therefore, being recommended for general cultivation by the Department of Agriculture. The area under these varieties and the amount of seed distributed by the Department are given in the following table :—

Variety.	Total area under the variety (including natural spread).	Amount of seed distributed by the Department.
C. 520	14,087 acres.	1,507 maunds.
Perso-American ..	10,938 ,,	2,736 ,,

C. 520 cotton is a pure line selection from the "roseum" type of U.P. Bengals, originally extracted from the material collected in Saharanpur and Bijnor districts as early as 1920-21. It yields high under irrigated and unirrigated conditions. When grown on a commercial scale at the Goverment Research Farm, Raya (District Muttra), the variety yields about 9 to 10 maunds of *kapas* per acre. With a staple length of about .0.73", a ginning outturn of about 35 to 37%, it is capable of spinning up to 10-12½ highest standard warp counts.

The variety has spread in general cultivation in the Middle and Upper Doab and is gaining ground in almost all the cotton growing areas in the United Provinces. Recently it has been in demand from many of the Central Indian States and Rajputana. When marketed pure its *kapas* is valued at about Re. 0-8-0 per maund more than that of ordinary *Desi*.

The Department in pursuance of the policy of curtailment of area under "short stapled cottons" is devoting considerable attention to the extension of the American variety under suitable soil and climatic conditions. A scheme for the distribution, extension and marketing of Perso-American, financed jointly by the Indian Central Cotton Committee and the Provincial Government is now under operation in the districts of Bulandshahr, Aligarh, Muttra and parts of Meerut and Etah.

Perso-American cotton is a selection from the Amercan types of cotton imported from Persia (Iran) and acclimatized in the United Provinces. When grown on a commercial scale at Raya and other suitable areas, *e.g.*, Budaun, etc., it gave an yield upto 13 to 14 maunds per acre. With a staple length of .85", a ginning outturn of 30-32%, it is capable of spinning up to 28-34 highest standard warp counts. The *kapas* of this variety ordinarily fetches a premium of Rs. 1-8-0 to Rs. 2 per maund over *Desi*, but during the last two seasons, it was sold at a price of about 35 to 50% higher than that of the local *Desi* cottons.

HYDERABAD STATE.

The total area under cotton in the State during the year 1942-43 was 29,73,167 acres compared to 32,83,391 acres during the year 1941-42, thus showing a decrease of 3,10,224 acres or 9.4% less than the previous year. The decrease is attributed to the "Grow More Food" campaign. The cotton affected by this reduction was of the short staple type.

Gaorani 6.—During the year 1940-41, the *talukas* of Hingoli, Basmat, Kalamnuri and Palam together with the Jagirs of Gangakhed and Shirdshapur of Parbhani District were added to the existing protected area. In the Gaorani Protected Area—parts of Nanded and Parbhani Districts—pure seed obtained from the reserve areas amounting to 95,87,598 lbs. was purchased and distributed to cultivators under departmental control both on *taccavi* and cash. An area of 5,75,442 acres in a block of about 1200 villages was covered with this seed.

Parbhani American.—In the Ghat areas of Aurangabad District, seed of Parbhani—American cotton, a selection from the local American variety amounting to 1,57,880 lbs., sufficient for 15,788 acres, was distributed to cultivators under departmental control.

Jarila Cotton.—In the low lands of the Aurangabad District, which is predominantly a short staple cotton area, *Jarila* cotton seed of 3rd and 4th generations obtained from the Agricultural Department of the Bombay Presidency was distributed to cultivators. The total seed obtained amounted to 3,83,040 lbs., sufficient for 31,920 acres. The seed from this area will be utilised for distribution over a wider area during the coming years.

Jayawant cotton.—This cotton was introduced in the South-western portion of Raichur District in the year 1931 by importing the seed from the Co-operative Cotton Sale Society at Hubli, and it has made steady progress since then. During the year 1941-42, the quantity of seed distributed and the area covered were 5,51,046 lbs. and 44,315 acres respectively. The natural spread under this strain amounted to 1,54,224 acres. In 1942-43, however, the seed distributed amounted to 4,80,084 lbs. and the area covered decreased by 80% due to crop failure owing to the paucity of rain in the previous season. In January 1943, famine was declared in all *talukas* growing *Jayawant* cotton.

The Department of Agricultural Propaganda in the Nizam's Dominions has set up an organization for multiplication and distribution of seed and marketing of the produce. The predominant features of this organisation are as follows :—

(1) Special staff is maintained by the Department to ensure every year the purity of the crop of the general as well as the reserve areas. Strict supervision is maintained throughout the life of the crop and also at the time of marketing, ginning and pressing.

(2) Special *taccavi* grants are provided both by Government and Co-operative Societies every year to purchase all the seed available from the reserve areas and to distribute it to the cultivators. The amounts of *taccavi* sanctioned during 1942-43 totalled nearly Rs. 6,75,000.

(3) Purity of the general as well as the reserve areas is guaranteed to the trade.

(4) On the strength of both the superiority and the guaranteed purity of the crop, a premium over the prices of the local varieties is secured from the trade. This premium is independent of the fluctuations of the market prices.

With this special organization in which both the cultivators and the trade collaborate, a rapid development of area under improved varieties is possible.

BARODA STATE.

Navsari District.—The total area under 1027 A.L.F. in this district was 1,99,800 acres. This included an area of 2,555 acres covered by 31,185 lbs. of farm nucleus product (A grade seed) and 26,100 acres covered by Societies and Unions from the 4,92,030 lbs. of seed issued to them. Of the remaining area, except for a small wilt affected area where B.D.8, a resistant strain, was grown, the whole of the district was under 1027 A.L.F. commercial cotton. During the season 37 bales of pedigree, 4,000 bales of certified and 1052 bales of standard (*i.e.*, guaranteed produce of the State commercial 1027 A.L.F. grown from Departmental seed) cotton were produced. Of these 2,707 bales were sold. The average premium over *Surti* for the Agmark certified produce was Rs. 16-7-7 while that for the standard was Rs. 8-2-8. The pedigree produce has not been sold so far. The total seed issued for the 1943-44 sowing is 1,984,800 lbs. including 30,800 lbs. to cover 2,200 acres of A grade, 3,43,200 lbs. to cover 24,700 acres of B grade and the rest for C grade or commercial sowing. Attempts to raise sufficient seed for various grades of Seg. 8-1 are made; the actual introduction of the new Segregate is proposed to be made in 1945 season. About 3,000 acres of Seg.8-1 are grown in this district.

Baroda District.—In this district the Cotton Control Act has been applied since May 1943 making B.D. 8 and B. 9 the standard cottons for the black and Gorat Soils of the District, respectively. B.D. 8 variety was cultivated

in seven *talukas, viz.*, Karjan, Shinor, Dabhoi, Sankheda, Tilakwada, Baroda and Padra while B. 9 was grown in Waghodia and Savli (Gorat area). The total cotton area in this district during the year was about 3,41,183 acres of which 28,000 acres were sown under B.D.8. Due, however, to the bad monsoon conditions the controlled area was reduced to 22,865 acres. The premium realized over the local was Rs. 65 more per *bhar* of cotton. The seed issued for 1943-44 sowing consisted of 6,840 lbs. of A grade, 2,27,820 lbs. of B grade and 4,75,880 lbs. of C grade or commercial crop to cover 676 acres of A, 23,843 acres of B and 47,190 acres of C respectively. The Department intend to switch over to 'Vijaya' cotton in the year 1945. Attempts are being made to bring substantial areas under the various grades. Owing to its higher ginning, fineness, wilt resistance and other good qualities, 'Vijaya' cotton is expected to be more attractive to the grower of this district. About 2,000 acres of 'Vijaya' were grown during the year, in addition to about 4,000 acres of 1027 A.L.F. grown in Bodeli area.

B. 9 has been selected as the standard cotton for the Gorat or light soil which covers an area of about 1,50,000 acres and is mainly confined to the Savli and Waghodia talukas. A scheme to expand this cotton has been recently started. The Department issued, during the year under report, 7,900 lbs. A grade, 80,880 lbs. B grade and 1,38,720 lbs. C grade seed for sowing about 775 acres under A, 9,000 acres under B and 14,175 under C or commercial grade respectively. But owing to bad monsoon the ultimate inspected and checked areas were found to be about 670 of A and 6,314 acres of B. The *kapas* fetched Rs. 5 to 7 more per *bhar*. The seed issued for the 1943-44 sowing was 20,884 lbs. to cover 2,117 acres of A, and 1,74,435 lbs. to cover 20,327 acres of B, and about 6,54,299 lbs. of C or commercial grade seed to cover 64,147 acres respectively. A small area of 35 acres has been sown to 'Vijaya' in this area also.

Mehsana District.—The Department is concentrating on Wagad 8 in this district and is building up a seed organization based on this variety. The area under Wagad cottons was about 75% of the total cotton area, *viz.*, 1,00,853 acres in the district. The seed issued for the 1943-44 sowing was 42,857 lbs. to cover 2,571 acres of A grade, 53,506 lbs. to cover 3,210 acres of B grade and 4,32,240 lbs. to cover 25,935 acres of commercial or C grade areas. The scheme sanctioned by the Indian Central Cotton Committee to expand this type will be put into operation during 1943-44. season. Wagad

cottons are in particular demand in Ahmedabad and Wagad 8 commanded a premium of Rs. 6 to Rs. 7 on ordinary Wagad.

Amreli District.—The cotton on which the Department is at present concentrating in this district is C.520. During the year the total area under seed organization was 5,350 acres. The seed issued for 1943-44 sowing in various grades was 90,600 lbs. to cover about 4,450 acres. The seed issued was less than that in the previous season owing to the switching over of some of the acreage to food crops.

RAJPIPLA STATE.

With a view to improving the variety of cotton grown in this State, a special enactment named the "Rajpipla Cotton Improvement Act" was passed in 1921, and made applicable throughout the State. Since the passing of this Act the sowing of *Goghari* or any other variety of short staple cotton is prohibited in the State. Best available quality seed of the 1027 A.L.F. variety is purchased and supplied to the cultivators by the State. A strict watch is maintained to see that no other variety is sown and in order to eliminate all possibility of admixture with short staple cotton, import of such cotton into the State is strictly prohibited. With a view to seeing that the purity and quality of the cotton is maintained, adequate control is also exercised in the ginneries and the pressing factories of the State, up to the stage at which the cotton is pressed into fully pressed bales with the prescribed marks. As a result, the cotton grown in the State has earned a high reputation in the market and is eagerly sought after by the merchants.

During the year under report, the best seed was purchased through the Cotton Superintendent, Surat and Commissioner of Agriculture, Baroda State and supplied as usual by the State to the cultivators. The total area under cotton cultivation in the State during the year was 121,148 acres and the total outturn 22,962 full pressed bales exclusive of about 3,200 bales taken by *bona fide* kheduts for sale outside the limits of the State. As usual the cotton secured ready custom and realised better prices than cotton available for sale during the season elsewhere.

CHAPTER III.

COTTON STATISTICS.

The total area under cotton in India during the year under review was 19,203,000 acres, showing a decrease of 4,948,000 acres as compared with the previous year. The decrease was largely due to the loss of export outlets for short staple cotton as a result of Japan's entry into the War and the 'Grow-more-food Campaign' started on a country-wide scale. The total estimated outturn for 1942-43 was 4,702,000 bales, against 6,127,000 bales in 1941-42.

INDIAN COTTON SITUATION—1942-43.

The season opened with a firm undertone in the cotton market owing to steady prices of yarn and cloth and the anticipation of a smaller Indian cotton crop, particularly as a result of the 'Grow-more-food Campaign.' *Jarila* January was quoted at Rs. 318 on the 1st September, 1942, and rose to Rs. 335 by the end of the month. The prices continued to improve under the influence of a steady demand in the spot market for desirable types of cotton which were scarce. The market was also beginning to be affected by the scarcity of wagon supply and difficulties in getting cotton to Bombay. Early in November, the order restricting the import of cotton into Bombay, except under a licence, was relaxed so as to permit any cotton which was tenderable against the Indian Cotton Contract to be imported without a licence and this had a steadying effect. Further, on the 19th November, the Government of India announced the constitution of the Cotton Movements Panel and a new scheme to ease the transport situation. For the first time after the commencement of the season, trading was resumed in the "Ring" on the 7th of December. The market became very firm owing to reduced crop estimates and better spot demand. Meanwhile the news of the bombing of Calcutta caused nervousness in the market, with the result that on the 23rd December, the quotation for *Jarila* registered a fall of Rs. 27, but the market again nearly recovered by the end of December. At this time owing to increased arrivals up-country and lack of fresh support, there was a short-lived setback in prices upto the middle of January, after which the market began to advance. The war news also showed improvement on all fronts and lent support to the market. From the 9th to the 22nd February trading in the Ring ceased to take place, though the market was officially open and from the 23rd February

to 3rd March, the market was officially closed. Private business was reported to have been done during this period for Indian Cotton Contract March Delivery around Rs. 490. During the first half of March, there was a hectic rise in cotton prices as a result partly of good spot demand, scarcity of desirable staples and soaring prices of cloth and yarn, which took Indian Cotton Contract May to Rs. 630 on the 13th March. On the 17th March, when the price was quoted at Rs. 609, the Hon'ble the Finance Member spoke in the Central Legislative Assembly regarding the advance in prices of cotton and threatened to take drastic measures and, this had a depressing effect on the market. The press communique issued by the Government of India on the 1st April declaring Government's decision to prevent forward trading in new crop being opened and their intention of liquidating the outstanding commitments on current contracts contributed to depress the market further. There was, however, a good recovery in prices from the middle of the first week of April which continued up to the end of that month. On the 1st May, the Cotton (Forward Contracts and Options Prohibition) Order, 1943, was published, prohibiting trading in options and also in any forward contract in respect of new crop. This order had a restraining effect. The Order was amended on the 15th May, excluding from its provisions forward contracts for *kapas* and cotton of specific qualities and types and for specific delivery at a specified price. This amendment coupled with the good spot demand contributed to a sharp advance in prices. On the 17th May, the quotation for Indian Cotton Contract May and July deliveries rose up to Rs. 660 and 674 respectively, the highest recorded for the season. The next day prices reacted sharply. On the 19th May, the Cotton (Forward Contracts in Current Crops Prohibition) Order, 1943, was published prohibiting trading in forward contracts in current crops after the 20th May. In pursuance of this Order, the Government of India fixed the rates of Rs. 565 and Rs. 568 for the Indian Cotton Contract May and July deliveries respectively on the 21st May, and all open business was closed out at the rates fixed by Government. Business in hedge contracts did not take place for the rest of the season. On the 27th May, the Government of India issued a communique advising mills not to pay more than the prices indicated by them for different styles of Indian cotton on the basis of Rs. 550 for Khandesh *Jarila* $\frac{3}{4}$" staple. Further, in the absence of hedging facilities, anxious holders of cotton began to unload with the result that spot prices registered a decline. The position was further accentuated by the announcement on the 1st June by Mr. M. S. A. Hydari, Secretary to the Government

of India, Department of Industries and Civil Supplies, at the meeting of the Textile Control Board that Government would requisition, if necessary, cotton from whomsoever held at prices recommended by Government. This uncertain position continued until the end of June, after which the spot market was steady for sometime. By the middle of July, owing to poor enquiry, coupled with distress sales by weak holders, the spot market witnessed a sagging tendency which continued through August. About the middle of August, steadiness was imparted to the market by the concerted action of certain merchants not to sell below the agreed minimum rates. In the meantime, the announcement by the Textile Control Board of ceiling prices for 12 standard varieties of cloth had a favourable effect and the season ended with a steady undertone in the spot market.

As regards the statistical position of Indian cotton the season started with an estimated carryover of 25.3 lakhs bales (400 lbs. net each) with the trade excluding spinning mills. The actual crop of 1942-43 on the basis of cotton pressed and unpressed cotton consumed in mills amounted to 46.0 lakhs (excluding extra-factory consumption of 4.5 lakhs bales), of which 30.3 lakhs bales were estimated to have been of staple length $\frac{7}{8}''$ and above. The consumption of Indian cotton by mills, amounting to 42.8 lakhs bales, was 2.5 lakhs bales higher than in the previous season. The receipts at mills of Indian cotton on the basis of voluntary returns amounted to 41.5 lakhs bales (400 lbs. net each). The actual receipts, however, were estimated to have been some 43.6 lakhs bales, including 14.0 lakhs bales below $\frac{7}{8}''$ in staple. The total exports during the season amounted to 1.6 lakhs bales including 0.9 lakh bales below $\frac{7}{8}''$ in staple. A noteworthy feature brought out by the figures is the fact that the surplus left from the season's crop, after meeting the mill and export demand, was less than a lakh of bales.

On the basis of the figures of actual production, mill consumption and exports, the calculated carryover of Indian cotton with the trade excluding

spinning mills, at the end of the season, is estimated at 26.1 lakhs bales as shown below :—

	In lakhs of bales of 400 lbs. net (excludes extra-factory consumption).		
	Total.	$\frac{7}{8}$" and above.	Below $\frac{7}{8}$".
Estimated stocks held by the trade (excluding spinning mills) on 31st August, 1942	25.3	5.7	19.6
Probable production in 1942-43	46.0	30.3	15.7
Total supply ..	71.3	36.0	35.3
Estimated receipts by mills in 1942-43 ..	43.6	29.6	14.0
Exports during 1942-43	1.6	0.7	0.9
Total distribution ..	45.2	30.3	14.9
Estimated stocks held by the trade on 31st August, 1943	26.1	5.7	20.4

REPORT ON THE STAPLE LENGTH OF INDIAN COTTON CROP.

A report on the estimated production of cotton according to staple length for 1942-43 season was issued in August 1943 ; the trade estimates of the crop were also presented in this report. Of the official revised estimate of 4,702,000 bales (compared with the trade estimate of 5,316,000 bales), 13% was of staple length 1" and above and 47% of staple $\frac{7}{8}$" to 31/32". Towards the end of the year, a Special Sub-Committee consisting of the representatives of the East India Cotton Association, the Karachi Cotton Association, the Southern India Millowners' Association and the Indian Central Cotton Committee was appointed to go into the question of revising the existing staple length groups and classification of Indian cotton thereunder in the light of the experience gained during the last six or seven years, and the changes that have taken place in the character of the Indian cotton crop.

DEMAND FOR VARIOUS TYPES OF INDIAN COTTON.

As usual, statistics relating to internal and export demand for various types of Indian cotton were compiled from information furnished on a voluntary basis and published in Statistical Leaflets Nos. 3 and 4 (1942-43). It is hardly necessary to emphasise the importance of these statistics to the trade and industry as well as to those entrusted with the responsibility of shaping and directing the cotton policy of the country. Receipts at mills of Indian cotton, during the season, were higher than those of the previous year by 64,000 bales, while exports showed a shrinkage of over 7 lakhs bales. Mill receipts of Indian cotton of staple length "$\frac{7}{8}$ inch and above" rose by 4.5 lakhs bales during the year, the offtake of short staple cotton (below $\frac{7}{8}$") being lower by nearly 4 lakhs bales as compared with the previous year. The exports of "long and medium staple" and "short staple" cottons were some 20 and 14 per cent, respectively, of the corresponding varieties exported in the previous year.

STOCKS.

The information collected in respect of stocks of cotton held in the country on the 31st August, 1943, was published in Statistical Leaflet No. 2 (1942-43). Trade associations, market committees and other authorities gave valuable assistance in the collection of figures of stocks of cotton held in the country at the end of the season. Stocks of Indian cotton held in India by the trade at the end of the season 1942-43, on the basis of voluntary returns, amounted to 17.8 lakhs bales, showing an increase of 2.9 lakhs bales on the previous year. As remarked in the last year's report, the trade stock figures still do not cover certain areas, while the information collected for some of the other areas remains incomplete. On the basis of the figures of actual crop, exports, mill receipts, etc., the carryover of cotton held by the trade on the same date is estimated at some 26.1 lakhs bales; one important cotton firm estimates the stocks at 29 lakhs bales. The question of ensuring that the trade stock figures are as complete as possible is being pursued energetically and it is hoped that, with the co-operation of Provincial Governments and States, the statistics would ere long be placed on a sound basis.

As the season adopted for the cotton crop of the Madras Province is the year ending 31st January, figures of stocks held in the province on this date are collected annually in addition to the figures relating to the 31st August. The

relevant figures for the 31st January, 1943, together with comparative details for previous years, are given in Appendix IV.

INDIAN MILL CONSUMPTION.

Figures of consumption of Indian cotton in mills in British India and Indian States for the years 1928-29 to 1942-43, based on the monthly statements issued by the Committee, are given in Appendix V. The total consumption of Indian cotton in mills in India during the season under report, *viz.*, 4,280,817 bales, showed an increase of 255,422 bales as compared with the previous season, and constitutes yet another record. Of the increase, 92% was accounted for by British India and the remainder by Indian States.

EXPORTS.

The exports of Indian cotton from British India during the season totalled 155,000 bales against 373,000 bales in 1941-42. On the average of the three financial years ending 1942-43, the value of cotton (including waste) exported from British India formed 28% of the total value of export of " Raw materials and produce and articles mainly unmanufactured " and 9% of the total value of all merchandise exported.

STATISTICS OF COTTON PRESSED.

During the season under review, 3,021,287 bales of cotton were pressed in British India and, 1,192,442 bales in Indian States, making a total of 4,213,729 bales for all-India; the corresponding figures for 1941-42 were 4,305,120, 1,769,398 and 6,074,518 bales, respectively. For India as a whole, the average net weight per bale of cotton pressed during the season under report amounted to 393 lbs., against 391 lbs. in the previous season. Further consideration of the suggestion for the compilation of statistics of cotton pressed according to trade descriptions has been postponed during the present emergency.

UNPRESSED (LOOSE) COTTON STATISTICS.

The statistics of cotton pressed do not account for the whole of the Indian cotton crop as, apart from the quantity utilised for extra-factory consumption, chiefly in the form of *kapas*, mills situated in cotton growing areas often use considerable quantities of ginned, unpressed cotton. During the year, 458,985 bales of unpressed cotton were consumed in mills in India against 562,013 bales during the preceding year. The relevant figures for 1928-29 to 1942-43 are given in Appendix V to this report.

STATISTICS OF COTTON GINNED.

The figures of cotton pressed do not cover the entire crop as, apart from ginned unpressed cotton consumed in spinning mills for which figures are available, both ginned unpressed cotton and *kapas* are also utilised for domestic purposes, such as, hand-spinning, making of quilts, mattresses, etc., for which there are no reliable data. If, however, ginning returns could be instituted, all that would be necessary for arriving at the actual crop would be to estimate the quantity of *kapas* used for domestic purposes. The two returns would at the same time serve as a check on each other. The submission of such returns is now in force in the Central Provinces and Berar, Bombay Province, Bengal, Sind, the United Provinces and Ajmer-Merwara and certain Indian States. It is hoped that the returns would be instituted in the remaining cotton growing Provinces and States at no distant date.

At the instance of the Committee, the question of the desirability of compiling the statistics of cotton ginned according to varieties was taken up with the Provinces and States concerned but in view of the decision to postpone, during the present emergency, consideration of a similar proposal relating to cotton pressed, further action in the matter has been deferred as both the returns have to be compiled on the same basis.

IMPROVEMENT OF COTTON FORECASTS.

The all-India cotton forecasts of the 1941-42 season were, as usual, subjected to a post-mortem examination by the Cotton Forecast Sub-Committee of the Indian Central Cotton Committee, at the close of the season, with a view to detecting sources of errors and suggesting remedial measures. The actual crop for all-India during 1941-42 was estimated at 70.8 lakhs bales against 5,980,000 bales forecasted in May 1942. The discrepancy lay mainly in the forecast estimates of the Punjab, Sind, Bombay and Madras Provinces. With a view to improving the present estimates of actual crop, the desirability of taking a complete census of stocks of cotton held in the country on a particular date towards the close of the season was stressed and the matter is being explored in consultation with the Provinces and States.

During the year under report, the Sind Government issued a Resolution directing that in future the yields of all crops should be made in terms of *maunds* per acre and not according to anna valuation. This change is intended

to rectify errors in forecasts arising from incorrect anna valuation. The recommendation of the Committee that both systems of reporting yield should be continued in the case of the cotton crop was not, however, accepted by the Sind Government.

In accordance with the recommendation of the Committee, the February and April all-India cotton forecasts which were hitherto designated as the ' Final ' and ' Supplementary ' forecasts have now been named as the ' Fourth ' and ' Final ' forecasts respectively.

As in the past, the estimates of the cotton crop were received by wire from the Department of Commercial Intelligence and Statistics and released in Bombay at a time previously fixed to synchronise with the time of their release in Calcutta.

SCHEME FOR CROP ESTIMATING SURVEY ON COTTON IN THE CENTRAL PROVINCES AND BERAR.

This scheme was sanctioned by the Committee in July 1942 for a period of one year and it came into operation on the 15th October, 1942. The object of the scheme is to provide a suitable technique for conducting crop-cutting experiments on cotton which form the most reliable direct basis for estimation of yield in any given season, as well as for the determination of the standard yield. The investigation was carried out in the Akola district of Berar, divided into six *tahsils* and ten random villages in each *tahsil* and two random cotton fields in each village were selected. The number of sampled villages formed $3\frac{1}{2}\%$ of the total. In each selected field, two plots, each $81' \times 162' = 3/10$ acre, were marked by a random procedure and each plot was sub-divided into six sections of 1/20 acre size for picking.

The results of the experiments indicated that the official estimate of yield for the Akola district based on anna value was at least 50% higher than the figures obtained by the investigation. These results, however, cannot be regarded as conclusive, as on the basis of ginning returns the forecasted anna valuation was reported to be as nearly correct as possible. It was also found that if the yields were to be directly estimated each season, solely from crop-cutting experiments, the number of experiments required to be carried out would be very large and the cost very high. On the other hand, it is thought that a reasonably small number of experiments would suffice for determining standard yields.

With a view to supplementing the results already obtained and increasing their value for practical application, the scheme has been extended for another year. In 1943-44, the experiments would be repeated in Akola district and in the adjoining Buldana district. Side by side with the operation of the scientific experiments, it is proposed to ascertain accurately the actual production of cotton in the two districts on the basis of ginning and pressing returns, movement of cotton, etc., by the establishment of a special organisation.

REPORT ON THE ACCURACY OF THE ALL-INDIA COTTON FORECASTS.

The publication of Statistical Leaflet No. 5 entitled " Report on the accuracy of the all-India cotton forecasts " has been suspended for the duration of the war, commencing with the issue for the 1941-42 season.

PUBLICATIONS.

The undermentioned statistical publications were issued during the year under report :—

(1) *Statistical Leaflet No.* 2.—Ninth Issue (1941-42), " Stocks of Indian raw cotton held in India by the mills and the trade on 31st August, 1942."

(2) *Statistical Leaflet No.* 3.—Ninth Issue (1941-42), " Receipts at mills in India of raw cotton classified by varieties—1941-42 season."

(3) *Statistical Leaflet No.* 4.—Ninth Issue (1941-42), " Exports by sea of Indian raw cotton classified by varieties—1941-42 season."

(4) *Statistical Leaflet No.* 1.—Tenth Issue (1942-43), " Report on the staple length of the Indian cotton crop of 1942-43 season."

CHAPTER IV.

COTTON MARKETING, LEGISLATION AND OTHER PROTECTIVE MEASURES.

(i) **Cotton Prices.**—The position arising from the remarks made by the Hon'ble the Finance Member in the Central Legislative Assembly on the 17th March, 1943, regarding cotton prices and the press communique subsequently issued by the Government of India in this connection was considered by the Committee. Whilst the Committee agreed that the speculative element in the trading of raw cotton should be eliminated, as far as possible, it was emphatically against the adoption of any measures that would adversely affect the interests of cotton growers by unduly lowering the prices of cotton. Having regard to the prices of other commodities, the Committee did not think that the prices of cotton then ruling could be regarded as being excessive; nor did it consider it correct to assume that the rise in the prices of cotton was entirely or even in large measure, the result of speculation. The real reason, in its opinion, lay in the fact that, finding cotton to be the cheapest commodity, many people had rushed in to invest their money in it. Incidentally, however, this had helped, in no small measure, to maintain the position of cotton which, taking into account the fact that there was in the country a considerable carry-over of cotton, might not otherwise have been as happy as it was. In the opinion of the Committee, there was little doubt that much of the upward trend in prices was due to genuine demand. It was accordingly urged that the question of cotton prices should be considered in relation to the prices of other commodities. It was pointed out that unilateral control without effective control of other commodities, particularly yarn and cloth, was bound to have an adverse effect on the interests of cotton growers and, therefore, on the economy of the country as a whole. The views of the Committee were communicated to the Government of India.

(ii) **Cotton baling hoops.**—Under the scheme of distribution of cotton baling hoops, to which reference was made in the last Annual Report, 6,105.6 tons of Lease/Lend hoops and 3,140.1 tons of hoops manufactured or held in stock in the country were made available to cotton pressing factories through the agency of the Committee. This represented nearly three-fourths of the season's requirements of the pressing factories in the country. Towards the end of August, 1943, the Government of India announced that for the 1943-44

season, cotton baling hoops, whether imported under Lease/Lend or produced in India, would be distributed by the Iron and Steel Controller on the advice of the Baling Hoops Advisory Committee. Cotton pressing factories receiving baling hoops from the Iron and Steel Controller were required to execute a bond to the effect that they shall not, except with the prior permission of the Baling Hoops Advisory Committee, recover, in respect of any baling operation, baling charges exceeding the rates prescribed by the Government of India, any infringement of this condition rendering the factory liable to pay a penalty extending to ten times the amount of the baling charges received and debarring it from receiving further supplies of baling hoops. At the instance of the Government of India, the Baling Hoops Advisory Committee considered the question of the desirability of enforcing pressing rates during the 1943-44 season and recommended that the maximum rate for pressing should be fixed at Rs. 10 per bale. This rate was based on the prevailing high cost of coal, fuel, stores and labour and on the assumption that certain factories would probably have to use hoops purchased at higher prices to meet a part of their requirements. It was assumed that in areas where the cost of labour, etc., was relatively cheap, competition would ensure that the factories did not take advantage of the existence of a maximum pressing rate. The recommendation was accepted by the Government of India. The Baling Hoops Advisory Committee also considered a reference from the Government of India suggesting that used cotton baling hoops should be brought under control in order to prevent profiteering on used Lease/Lend hoops. In consultation with the Iron and Steel Controller, the Committee recommended that the purchase, sale and movement by rail, road, sea or any other means of used hoops should be prohibited except under licence issued by the appropriate authority.*

(iii) **Coal requirements of Ginning and Pressing Factories.**—The question of the arrangements for the grant of priorities for the transport of coal required for ginning and pressing factories was considered by the Local Sub-Committee, at its meeting held on the 2nd October, 1942, at which the Controller of Coal Distribution and the Honorary Adviser on Mill Stores, Cotton Textiles Directorate, Bombay, were also present. After a lengthy discussion, the Sub-Committee accepted the view of the Controller of Coal Distribution that advantage should be taken of the existence of a central organisation like the

* The Cotton Baling Hoops (Control of Movement) Order,, 1943, was issued by the Government of India in October 1943, prohibiting the movement by road, river, sea or air of used or defective cotton baling hoops beyond the limits of the premises on which such baling hoops, for the time being, are situated except under a general or special order of the Iron and Steel Controller.

Indian Central Cotton Committee and that priorities in future should be granted only on the recommendations of the Committee working in conjunction with the Cotton Textiles Directorate, Bombay. The desirability of knowing the demand in a complete form so as to be able to determine the coalfields from which the supplies should be met and to correlate it with the requirements of other industries was emphasised, and it was decided that the Secretary, Indian Central Cotton Committee, in consultation with Mr. Greaves, Adviser on Mill Stores, should collect all the necessary data regarding the requirements of coal of the various ginning and pressing factories and draw up a plan for dealing with applications for priorities. Accordingly, a comprehensive questionnaire was sent out to all ginning and pressing factories and from the replies received a statement was prepared indicating the requirements of the various factories, and a basis was worked out for the grant of priorities for coal to them. Some 1,000 applications were received and disposed of during the year under report.

(iv) **Regulated Cotton Markets.**—Investigation into the financing and marketing of cultivators' cotton having established beyond doubt that cultivators obtain better prices for their cotton in tracts where regulated markets exist, Provincial Governments were requested by the Committee to establish such markets in all the more important cotton growing areas. Accordingly, legislation for the establishment of regulated markets has been enacted in the Provinces of Bombay, Madras, the Punjab and the Central Provinces, and the Hyderabad, Baroda, Indore and Sangli States. In the Province of Bombay, the Agricultural Produce Markets Act has been made applicable during the year to the cotton markets at Hubli, Gadag, Bavla, Sanand and Viramgam and, including these, there are now 12 such markets in the province. It is proposed to apply the Act to Nandurbar and Bagalkot markets in the near future. In the Punjab, the Punjab Agricultural Produce Markets Act is in force in 130 localities. In Madras three regulated markets continued to function at Tirupur, Adoni and Nandyal. In Hyderabad State, in addition to the 22 markets already established, the Hyderabad Agricultural Produce Markets Act was made applicable to Parbhani.

(v) **Agmarking.**—During the year, Agmarking was introduced at Hubli, Gadag, Bailhongal and Bijapur as a guarantee of purity of cotton by affixing Agmark labels to bales after supervision of ginning and pressing by the special staff.

(vi) **Universal Standards.**—As mentioned in previous reports, since 1934, with the co-operation of the East India Cotton Association and the

Karachi Cotton Association, Universal Standards common to both the markets have been prepared by a special Sub-Committee of the Indian Central Cotton Committee. At the instance of the Associations, however, it was decided during the year to drop the preparation of Universal Standards for the period of the war.

(vii) In order to check the spread of undesirable or inferior types of cotton and insect pests and diseases and other malpractices, several legislative measures have been passed by the Central and Provincial Governments on the recommendation of the Indian Central Cotton Committee. These are dealt with below.

(a) **Cotton Transport Act.**—A brief account of the working of this Act is contained in previous reports. The Aundh State in Bombay Province has made the Act applicable to the State areas. In Madras and the Central Provinces, the Act worked satisfactorily. In the Southern Division of Bombay Province, 35 cases of illicit import of cotton by road were detected. In eight cases fines imposed ranged from Rs. 5 to Rs. 50. In the remaining cases warnings were given. There was no change in the protected areas.

(b) **Cotton Ginning and Pressing Factories Act.**—The Cotton Ginning and Pressing Factories Act, 1925, applies to the whole of Birtish India, and practically all cotton growing Indian States have passed similar legislation or enforced the main provisions of the Act. Only important changes that have taken place during the year under report are dealt with here; for fuller details previous reports should be referred to.

It was reported last year that the Central Provinces Government had been requested to amend Sub-sections 9(1) and 9(1A) of the Cotton Ginning and Pressing Factories Act, 1925, in its application to the Province with a view to withdrawing the exemption granted to small factories under the proviso to these Sub-sections as it was being taken advantage of by some ginowners in the Central Provinces and Berar. The Provincial Government intimated that it did not consider that there was sufficient justification for the proposed legislation to delete the proviso, especially during the war time, when, owing to shortage of fuel oil, new factories of not more than four roller gins were not likely to be set up. The Committee, however, was not in favour of the amendment being shelved on this ground. It was pointed out to the Provincial Government that although the malpractice in question was not rampant at the moment, it might become so at any time and that preventive legislation

was therefore necessary. The Central Provinces Government, while agreeing that the legislation in question might be necessary if the malpractice became rampant, did not consider it necessary to undertake legislation of this kind in the present circumstances or during the present emergency.

Last year, the Committee made a recommendation that in those provinces where the malpractice of mixing old with new crop exists, it should be laid down that the pressowner who knowingly mixes old crop with new cotton or the owner of cotton who gets the mixture pressed, should be made liable unless, when old or a mixture of old and new crops is pressed, an additional mark "old" is put on the bale. The recommendation was given effect to by the Government of Sind in the Cotton Ginning and Pressing Factories (Sind Amendment) Act, 1943. The necessary amendment in the existing legislation was also made by the Baroda Durbar. The Government of Bombay intimated that the extent of the malpractice of mixing old cotton with new crop was not such as to justify taking any action in the matter. The Madras Government did not consider that there was any case in that Province for undertaking legislation of the kind suggested.

Out of 67 Indian States which have enforced in their territories the main provisions of the Cotton Ginning and Pressing Factories Act as applied to British India, by legislation or executive orders, weekly returns of cotton pressed were received from 60; in the remaining 7 States, pressing factories did not work during the year.

(c) **Prevention of introduction of Foreign Cotton Pests.**—In order to prevent the introduction into India of the Mexican Boll-weevil (*Anothonomus grandis*) with imported American cotton, at the instance of the Committee, regulations have been imposed by the Government of India under which the import of American cotton into India is prohibited except through the port of Bombay where it must be fumigated with hydrocyanic acid gas before entry into the country. The work of fumigation is carried out under the technical supervision of the Secretary, and the cost involved is met by the levy of a small fee from importers on each bale of American cotton fumigated. Owing to the restrictions necessitated by the war, there were no imports of American cotton during the year under review.

The Red (Sudan) Bollworm (Diperopsis castanea) and other pests.—The restriction on the import of foreign *kapas* (unginned cotton) and of foreign cotton seed remained in force throughout the year.

(d) **Cotton Control Acts.**—Cotton Control Acts are in operation in the Provinces of Madras, Bombay and the Central Provinces and in the Baroda and Bhopal States. The aims and objects of these Acts in the areas where they are in force are stated in previous years' reports. In so far as the Madras Province is concerned it is reported that no breach of the Act was committed in the Coimbatore, Madura and Ramnad districts. In the Tinnevelly district, 178 suspected samples were seized, of which 159 were certified to contain *Pulichai*. Prosecutions were launched against 147 owners, of whom 112 were convicted ; 35 cases are pending. The fines levied amounted to Rs. 965.

In Bombay, the spread of Selections 1A in preference to 1027 A.L.F., in parts of Surat district where *Goghari* was formerly grown, is still going on, mostly in Bardoli and Jalalpur *Talukas*, on account of higher ginning percentage of the former and unremunerative premium for the latter. The new improved variety " Suyog " which is nearly as good as 1027 A.L.F. in staple and as Selection 1A in ginning, is being extended by the Agricultural Department. This is expected to solve the problem of the tract.

On account of the mixing of inferior cotton with superior types in the Southern Mahratta Country, a draft notification has been submitted to Government with a view to applying the Act to the tract in question. Government have notified their intention to apply the Act to East Khandesh District where *Jarila* is spreading rapidly. The question of applying the Act to the whole of Khandesh is under consideration.

In Baroda State, the Act worked very effectively during the year. In Navsari District 65 farmers were prosecuted and fined for contravening the Act. The Act was newly applied to the Baroda District during the year in nine out of eleven talukas and B.D. 8 and B. 9 were declared as standard varieties for 7 and 2 *talukas* of black and gorat soils respectively.

CHAPTER V.

RESEARCH.

A number of research schemes among which the most important are those for cotton breeding for the improvement of quality, are in-operation in the various cotton growing Provinces and States. The majority of these schemes are financed entirely by the Committee, while the cost of others is borne partly by the Committee and partly by the Provincial Government or State concerned. Research on cotton technology is carried on at the Committee's Technological Laboratory. In addition, trained Technological Assistants are posted at the Cotton Research Stations at Lyallpur, Mirpurkhas, Cawnpore, Surat, Dharwar, Coimbatore and Parbhani, to help the botanists in charge in their work of breeding improved varieties of cotton.

RESEARCH ON COTTON TECHNOLOGY.

Research on cotton technology and the testing of cotton fibres, yarns and cloth are carried on at the Committee's Technological Laboratory. A brief summary of the work done during the year is given below; full details are given in the Annual Report of the Laboratory which is issued as a separate publication.

There was a noteworthy increase in the use made by the cotton mills and firms of the facilities offered at the Laboratory for making fibre and spinning tests. The total number of samples received for tests was 1129, on which 234 reports were issued during the year. Among the agricultural samples tested were those cottons grown pure and in mixed cultivation in Hyderabad State and at Indore, samples of *Jayawant* and New *Jayawant*, samples of *Jarila* cotton raised in different localities and also from seeds of dry and irrigated crops, *Hirsutum* types grown in Bengal, samples grown from seeds exposed to X-ray treatment for different periods, samples grown in North-West Frontier Province and in Bikaner State, etc. etc. These tests enable the breeders to decide which of the varieties represent an improvement over the existing types and are thus likely to bring higher monetary return to the cultivators. Valuation reports made by an expert grader for estimating the acre-cash values of strains under trial in all the breeding schemes of the Committee were also supplied to the breeders. In addition, tests were made on

many representative trade varieties of Indian cottons, and the results of these tests were published for general information in the form of Technological Circulars and Bulletins.

The Testing House of the Laboratory received samples from various sources such as Government Departments, cotton mills, firms, etc., covering a wide range of fabrics including a large variety of materials for the use of the Army, the Navy, the Air Force and the War Hospitals.

On behalf of the Agricultural Marketing Department of the Government of India, tests were made on a large number of samples to find out suitable criteria for quality control for the purpose of applying AGMARK to 1027 A.L.F., V. 434 and Sind *Sudhar*. Similarly, the work on the scheme for the survey of the cellulose bearing materials of India, on behalf of the Council of Scientific and Industrial Research, was carried a stage further during the year.

In addition to the above tests, a number of technological investigations are in progress while some of them were completed during the year. These will be briefly mentioned. (1) In view of the difficulty in obtaining sufficient quantities of long-staple foreign cottons under the present war conditions, tests were made on the combing of good quality Indian cottons which gave interesting results which were published, (2) a special technique for spinning very small size samples, weighing, say 2 lbs., employing the ordinary cotton spinning machinery was evolved at the Laboratory, (3) the effect of using different front-roller speeds, roller settings and different weights on sliver in the draw-frame is under investigation, (4) the effect of employing different speeds of beater and fan in the Crighton Opener is being studied, (5) evolution of a method by statistical analysis by which it would be possible to combine different yarn strength results for accurately judging the significance of the difference between any two samples, (6) influence of swollen hair diameter on the spinning quality of *Arboreum* cottons, (7) influence of manurial treatment on the fibre properties of *Gaorani* 6 has been studied, (8) the work on the central problem of the Laboratory, namely, the prediction of the spinning quality of Indian cottons from their measurable fibre characters has been pushed a stage further by showing that better agreement with the actual results is obtained if the Indian cottons are divided into well defined groups.

Among the other activities, mention may be made of the work on Indian linters. After completion of the report on a survey of Indian linters work

was continued on the effect of different kier-boil and bleach treatments in order to find out the optimum conditions for the manufacture of various grades of chemical cotton possessing definite physical and chemical properties.

During the year two new devices were designed and made, which are expected to prove useful. These are :—

(1) An attachment incorporating original ideas has been designed by means of which it is possible to maintain the density of seed-roll in a saw-gin at a constant and desired level. The density of the seed-roll is perhaps the most important factor in determining the quality of ginned cotton. The new device would ensure not only the smooth running of the saw-gin but also the production of a uniformly good quality lint.

(2) A simple form of Quartz Micro-balance, with two ranges 0-0.5 mgms. and 0-5 mgms. has been designed which dispenses with the use of the low power telescope, and can be used either for the determination of fibre-weight per inch by the ordinary method or with a Balls Sorter or the Stapling Apparatus. It can also be used advantageously in micro-analytical work.

FUNDAMENTAL RESEARCH.

Fundamental research on cotton is carried on at the Institute of Plant Industry, Indore, which was established with the object of providing a central research station in the black soil areas of the Malwa Plateau. In April 1940, the working of the Institute was re-organised as a result of which fundamental research on genetics and plant breeding, physiology and field plot technique is carried out under a special scheme Cotton Genetics Research Scheme. An annual subsidy of Rs. 30,000 is, however, given to the Institute for work on other crops for the Member States, as well as for seed multiplication, distribution and demonstration and such agronomical and chemical investigations as might be considered necessary for the benefit of the States. The work of the Institute, *viz.*, varietal tests and seed multiplication, followed the lines of the previous years. A detailed account of this work is published separately in the Annual Report of the Institute. A review of the progress made during the year under the cotton Genetics Research Scheme is given below :—

Genetics.

Fuzz grades in hirsutum cotton.—The F_2s of crosses among different grades of fuzz (1-10) were grown during the year and except in one or two cases where the results indicated a mono-factorial inheritance, the general behaviour would rather support the multifactorial hypothesis. One point in support of the latter is the observation that the mean values of F_1s and F_2s are found to increase as the parents used belong to the higher grades of fuzz. Another point in support of it is the fact that different fuzz grades isolated from a local sample of *hirsutum* are found to breed true to the respective grades with very slight variation on either side of the mean. Further work in progress should decide the issue. Another interesting observation made in these hybrid progenies is that there is an association between the lower grades of fuzz and poorer ginning percentage a point which Silow has also observed in his studies.

Red leaf in G. hirsutum.—In the fuzz grade experiment cultures, a type of red leaf (uniform coppery red) at or soon after the onset of flowering appeared to segregate more or less sharply from green plants. The red leaf plants under Indore conditions do not appear to be at a disadvantage compared to the green ones in respect of seed and fibre maturity and, in addition, were invariably earlier than the green plants. From preliminary observations it is considered that this red leaf-green distinction has a single factor difference as its basis. The same material was also examined for incidence of jassid attack. It was found possible to score the plants for different degrees of jassid attack and next year's work should show how far this grading is dependable. Jassid attack is found to bring on another type of reddening of the leaf and this being patchy can be easily distinguished from the red leaf mentioned earlier. It is only where both the types of red leaf occur together that the situation becomes complicated.

Locular composition.—From an original mixture of *desi arboreum* cotton obtained from Dhar a few years ago, a strain is being isolated which is characterised by 5-locked bolls as distinct from the 3-locked condition. Preliminary results would indicate that the difference is heritable and is dependent on a single gene difference, the 5-locked condition being a recessive. This is confirmed by an F_1 plant of a cross between the two types which is 3-locked. It may, however, be mentioned that the 4-locked boll is a variation of either the 5-locked or 3-locked condition.

Single leaf mutant.—The F_3 data obtained during the year have confirmed the F_2 results reported last year that the abnormal segregation between the normal and mutant leaf is such as would be expected in a 7 : 3 gametic ratio instead of the usual 1 : 1. The cause of this abnormal behaviour is under cytological investigation. The single leaf gene is found to segregate independently of petal colour and lint colour genes.

Anthocyan genetics.—The allelism of a new green stem spotless member of the R_2 series is established. It has proved recessive to green stem, ghost spot. Its relationship with other members of the series is under investigation.

X-ray work.—The X-5 generation of the X-rayed Upland strain, M.U. 4, consisting of treatments B and C, (seeds exposed to 10 and 20 minutes respectively) has again scored over the control A in mean maximum halo-length and ginning percentage. The improvement effected by the treatments has thus been sustained for 5 generations. A fibre test report on the lint from last year's experiment has shown that C is 7% longer in staple than either A or B and both B and C are 12% less in fibre weight than A. Both B and C have, however, a slightly lower fibre maturity than A. Periodical observations on the three bulks were taken qualitatively on vigour of the plants by a number of persons independently in a small bulk trial and in every observation, the treated plots, B and C, appeared better than A. In the final yield though B and C showed a numerical increase over A, the differences were not significant. In the progeny row trials, one of the progenies from C has given an outstanding performance over M.U. 4 in yield, ginning percentage and halo-length.

To confirm the results obtained so far, fresh selfed seed of a single plant from M.U. 4 has again been exposed to X-rays for 10 and 20 minutes and sown during the year along with untreated control seed of the same plant.

Wilt work.—In the homozygosity test for wilt resistance, Dhar No. 43 (Family 2), which has proved as resistant as *Jarila* to wilt under field conditions, does show heterozygosity under intensive wilt conditions allowing scope for improving its resistance by further selection. Two of the progenies out of this showing the highest resistance are also found to be significantly better than the other progenies with regard to halo-length which still shows a fair amount of variability.

In the crosses between Malvi and *Jarila*, twentynine F_4 families were tested in progeny row trial against Malvi and *Jarila*. Of these, six have proved as good as Malvi in yield and as good as *Jarila* in ginning percentage

and halo-length. Some of the selected progenies were grown under controlled conditions of humidity and temperature in Glass House and the best of these in quality combined with a high resistance have been selected for further trial under controlled conditions.

Study of the potentialities of different ecotypes with regard to combination of economic characters.—Eleven selected quality *arboreum* strains had been crossed with each of 9 selected *Bengals* giving 99 sets of F_1s. These F_1s had been grown in a replicated trial with 5 replications last season along with the 20 parents. The object of the experiment was to study the behaviour of F_1s in order to correlate it, if possible, with the performance of F_2 and subsequent generations. The F_1 data had been analysed during the year from the view point of (1) presence of heterosis and (2) value of different crosses for crossing. The characters studied in the F_1s were growth (height), node number, ginning percentage, halo-length and fibre-weight. The indications obtained are (1) there is a significant general heterosis with regard to all characters except fibre-weight; (2) the F_1 values of the present crosses, with a few exceptions, follow the same order as that of the parental strains for all the characters. A replicated progeny row trial with F_2s and parents of crosses selected on the basis of the above analysis has been carried out during the season and the data await analysis. Some of the selected F_2s were also grown in replicated experiments at Lyallpur, Ganganagar, Akola, Nanded and Coimbatore with the co-operation of the respective Cotton Botanists and the data will be examined along with those obtained at Indore.

Physiology.

Simple method of determining fibre weight in early stages of plant breeding.—Since next to fibre-length, fibre-weight is the factor contributing to quality, a simple method of determining fibre-weight which the Plant Breeder himself can adopt has been under investigation and such a method based on sampling bunches of fibres of definite lengths from individual combed seeds with a special cutter has been devised. The use of the technique has shown that an observer can carry out 10-12 determinations per hour. It can be said that in varietal and agronomical trials as well as in replicated progeny row tests, the fibre-weight can be determined with a standard error of 4% of the mean by examining a small number of bunches per plot, depending upon the number of replications. While the proposed technique has undoubtedly brought measurement of fibre weight within the range of Plant Breeder's work, more

work would appear necessary to increase the speed of work and to further simplify the technique.

Seed size and Plant Vigour.—A preliminary experiment begun in the previous year was repeated during the year with 3 *desi* and 3 American strains where the seeds separated into three groups, large, medium and small were grown in a replicated experiment. In the early stages of growth, it is found that the initial advantage of heavier seed is maintained in the fresh and dry weight of the seedlings and in initial height. The vigour due to heavier seed particularly in the *desi* strains can be visually observed right through the growth period. But in the Americans, the early differences in favour of heavier seed is not maintained in the later stages. In crude yield of *kapas* the heavier seed exceeded the smaller in all the strains. But in the adjusted yield of *kapas* and in the crude and adjusted yield of lint, the heavier seed succeeded significantly the smaller only in the case of *desi* cottons. It is found that it is the total number of bolls and not the seed number nor weight of *kapas* per boll that has contributed to higher yield in the case of heavier seed. In both *desis* and Americans the differences in the size of seed sown are maintained in the produce obtained. That the smaller seed sown gives a higher ginning percentage is due to the lower seed weight. The experiment has shown clearly that yield, particularly in the *desis*, can be increased by sowing heavier seeds. A feasible and easy method of separating out heavier and larger seeds has to be found, before the results can be translated into actual agronomic practice.

Experiment with coating cotton seed with Ammonium sulphate before sowing.—At the suggestion of Dr. Kalamkar who has obtained phenomenal increase in yields by sowing seeds coated with Ammonium sulphate, experiments were also undertaken at Indore. Seeds were first treated with adhesives like clay, gum and lanolin and were then coated with as much Ammonium sulphate as would stick to the seed. The experiment consisted of Ammonium sulphate coated seed and seed with enough Ammonium sulphate as had gone in the coating applied separately with the seed at the time of sowing. It was found that Ammonium sulphate coated seed suffered very much in germination, the seed where Ammonium sulphate was applied separate also suffering though not to the same extent as the former. Though the yield of cotton is definitely very high in the case of Ammonium sulphate treated seed either as a coating to the seed or applied at the side, so long as germination is affected, the practice

has no practical possibility. If ways and means can be found to so apply the Ammonium sulphate in the field at an optimal distance from the seed which will be far enough not to affect germination, but near enough for the young germinating seedlings to utilise it at the earliest possible moment, the practice can become useful. Experiments on this question are under way.

The other physiological experiments in progress during the year were concerned with (1) a study of germination in relation to time of sowing, depth of sowing and condition of seed—soaked or dry ; (2) determination of a sounder criterion than node number of the plant for judging earliness as node number is found vegetatively correlated with plant vigour and (3) vernalising cotton seeds.

Application of discriminant function in cotton breeding.—To determine what relative weight was attached to the various phenotypic components of yield in order to consider their order of merit in selecting for higher yield, a replicated experiment was conducted with 32 strains of *G. arboreum* var. *neglectum* cottons collected from all over India. The yield components studied in the experiment were (1) No. of bolls per plant, (2) No. of seeds per boll, (3) Weight of seed cotton per boll and (4) ginning percentage. Quantitative observations on the above characters were taken on sample plants in the plots and the several analysis of variance and covariance were worked out. The coefficients of expressions which may best discriminate the genotypic yield potentialities of the varieties were :

	For yield of seed cotton.	For yield of lint.
No. of bolls per plant	+0·498	+0·447
No. of seeds per boll	+0·325	—1·569
Weight of seed cotton per boll	+3·093	+5·029
Ginning percentage	—2·041	—1·775

It would appear that weight of seed cotton per seed is of primary importance in selecting for higher yield of both seed cotton and lint. Higher ginning percentage has an adverse effect both on yields of seed cotton and lint. The

number of bolls per plant and the number of seeds per boll are of less importance.

In order to test whether the above results can provide any guidance in making selections within an indigenous cotton variety of a tract, another trial consisting of progenies of Malvi from random plants in the local mixed population has been carried out. Observations have been recorded as in the other trial and when these are analysed the results should give information on the question of a discriminant function.

Other miscellaneous studies carried out during the year were (*i*) determination of the suitability of any particular material for selection by studying the variability in the material and what part of that variability was genetic (*ii*) a uniformity trial with cotton with a view to improving the technique for progeny row trial, and (*iii*) progeny row trials of crosses in *desi* (mainly involving G. *anomalum* and Upland material). In the last case one of the progenies from an S. L. D. type is outstanding in yield, halo-length and resistance to jassid attack though low in ginning percentage and might prove valuable as a parent in breeding work.

COTTON RESEARCH IN PROVINCES AND STATES.

BOMBAY.

(a) **Broach Cotton Breeding Scheme.**—The Cotton Breeding Scheme at Broach has been in operation since April 1932. The original object of this scheme was to obtain, by selection or hybridization, suitable types of cotton possessing wilt-resistant, high yielding, high ginning and superior spinning qualities, to replace the local mixture, a large proportion of which consisted of *Goghari*, a short staple, high ginning (40%) variety. In view, however, of the Committee's policy to replace, wherever possible, short staple with medium and long staple cottons, attention is now being concentrated on wilt-resistance, high yield and fibre length.

The breeding of wilt-resistant types originally formed part of the Broach Breeding Scheme, but as it was considered desirable that this work should be done under optimum conditions of wilt infection, and as the required conditions, especially soil temperature in pots, were difficult to maintain at Broach, this part of the work was transferred to Poona in June 1935, together with similar work on cottons for the Jalgaon tract.

The synthetic strain 'Vijaya' (Segregates 1-2 and 1-6) evolved under the scheme is stated to be highly wilt-resistant besides possessing a ginning percentage of 41 against 33·7% of B.D.8 and 41·3% of Broach Local and a spinning value of 38s compared to 38-1/2s of B.D.8 and 13-1/2s of Broach Local. In respect of yield, it is reported to be on a par with B.D.8.

During the year under review, 13 strains, including 1-2 and 1-6, were tested against B.D.8 and Broach Local in wilt-free and wilt-sick soils. Of those in the wilt-free area, only one strain, 30-57, was found to significantly outyield B.D.8; the differences between the other strains and B.D.8 were not significant. In respect of lint yield, segregates 30-57, 54-59, 73-33, 1-6, 5-18 and 1-2 were significantly better than B.D.8. The ginning percentage of all the segregates is superior to B.D. 8 while their lint length is more or less equal to that of B.D.8. On the wilt infected area, B.D.8 and all the strains except 76-1 and 6-22 were free from mortality. The good performance of the segregates on wilt-free soil was more or less corroborated on the wilt-sick soil.

Village trials of segregates 1-2 and 1-6, with B.D.8 as 'control', were conducted as in the past years, in 3 black-soil centres and one centre in *gorat* soil area. The segregates were, on the whole, as good as B.D.8 in point of yield; owing to their high ginning outturn their lint yields were 51 and 59 lbs. more per acre respectively. It is now proposed to distribute the 'Vijay' segregates in replacement of B.D.8 and Broach Local in the Nerbudda-Mahi and Mahi-Sabarmati zones.

To introduce early maturity, the segregates 1-2 and 1-6 have been crossed with early Maktampore selections.

Under the wilt breeding part of this scheme, the object is to evolve a cent per cent wilt-resistant type from the material available at Broach. The testing, during the year, for 100 per cent wilt-resistance in pot culture at Poona was confined to the most promising segregates 1-2, 1-6, 3-1, 5-18, 76-1 and 7-29. The former three showed a much higher degree of wilt-resistance than the two segregates 5-18 and 7-29. Of the last two cultures, 7-29 a derivative from the back-cross (B.D. 8×G.A. 26)×B.D.8 was more resistant than 76-1, a selection from the straight cross, (B.D.8×G.A.26). The study of the crosses between K.F. and 1027 A.L.F. indicated that the K.F. parent was homogenous as regards its reaction to *Fusarium* attack.

(b) **Jalgaon Cotton Breeding Scheme.**—This scheme has been in operation since April 1932. Its original object was to obtain, by selection or hybridization, suitable wilt-resistant types with heavy yielding, high ginning and good spinning qualities, to replace the local mixture of N.R. and *Banilla* cottons in Khandesh. Wilt breeding work was originally included in the Broach and Jalgaon Cotton Breeding Schemes, but, in August 1936, it was decided that the wilt work should be treated as a separate scheme from the 1st April, 1937. In July 1941, the wilt-breeding scheme was extended up to 31st March, 1947.

During the year under review, five cultures—4-G-2-3, 4-G-2-5, 9-2-7-3, 9-2-7-5 and 9-2-8-3—of *Dokras* cotton were tested against *Jarila* ; all of them proved inferior to the control in respect of yield ; they were, with the exception of 4-G-2-3, however, superior to *Jarila* in ginning outturn. The promising cultures will be tested in the ensuing year.

Segregates from the following crosses were tested against *Jarila* for yield:—

1. (*Jarila* x N.R. 5 x New Million Dollar) F_4.
2. (*Jarila* x N.R. 5) F_5.
3. (*Jarila* x New Million Dollar x *Jarila*) F_4.

The cultures from the first and third crosses were found to be inferior to *Jarila* and hence work on them will be discontinued. Out of the five families tested from the second cross, four gave better yields than *Jarila* whilst the yield of the fifth was on a par with it. All these cultures, however, were superior to *Jarila* in respect of ginning percentage and wilt resistance.

Comparative yield trials of *Jarila* and local were conducted at Jalgaon, Dhulia and Bhadgaon farms. At the first two places, the net gain per acre realised by *Jarila* over local was Rs. 37-8-0 and Rs. 20-10-0, respectively. It is proposed to discontinue these trials as *Jarila* now occupies almost 86% of the total area in Khandesh.

Under the wilt-breeding part of this scheme, progenies of 8 plants of two cultures of *Jarila* were tested in pot culture under controlled conditions of infection. Twenty-four plants were transplanted into the infected field for further testing.

(c) **Scheme for breeding wilt-resistant cottons in Surat area.**—This scheme was sanctioned by the Committee in August 1936 and commenced work in April 1937. The object of the scheme is to obtain a strain of cotton

completely resistant to wilt and suited to the natural conditions obtaining in the Surat tract. This is sought to be achieved either by selection in 1027 A.L.F. or by crossing this cotton with B.D.8 or other wilt-resistant strains.

During the year under report the following crosses were tested in the wilt-sick plot at Shera and desirable cultures with good resistance were selected for further testing :—

(1) 8-1 x K.F.

(2) [8-1 x {(B.D. 8 x G.A. 26) x B.D. 8} F_6-1-6] F_4.

(3) [1027 A.L.F. {x (B.D. 8 x G.A. 26) x B.D. 8} F_6-1-6] F_4.

(4) (8-1 x 1027 A.L.F.) F_8.

Segregates 3 and 7-2 derived from (8-1 x 1027 A.L.F.) F_8 above are said to combine the agricultural characters of 1027 A.L.F. with the wilt-resistance of Seg. 8-1.

In the wilt-sick plot at Shera, the sibs of Seg. 8-1 recorded a mortality ranging from 0 to 10%, against 22.5 to 50% of 1027 A.L.F. Three cultures which showed nil mortality were retained for further study.

(d) Scheme for improvement of Wagad cotton at Viramgam and Jagudan— While examining the possibility of growing medium and long staple cottons in the short staple areas of India, the Committee, in August 1935, decided that, in view of the absence of any serious attempt to improve the cotton of the large *Dholleras* tract, a comparative study of Indian and Iranian *herbaceum* cottons should be undertaken, with the object of finding out one or more suitable types for the tract. A special officer was deputed to Iran to collect *herbaceum* types of cotton grown there and, in August 1936, a five-year scheme was sanctioned for the improvement of *Wagad* and *Mathio* cottons, the work on *Wagad* cottons being centred at Viramgam and that on *Mathio* at Amreli. The objects are the improvement of *Wagad* cottons for (*a*) quality and yield and (*b*) earliness in order to escape frost, and the replacement, if possible, of the inferior *Mathio* cotton of Kathiawar by early *herbaceum*. These are sought to be achieved by (*a*) selection in *Wagad* cotton, (*b*) hybridization with Surti-Broach quality cottons like 1027 A.L.F. and B.D.8 and (*c*) hybridization with Iranian *herbaceums* known to be early and of better quality.

The whole of the Wagad area is divided into two main tracts: (*i*) the Viramgam tract, characterised by low rainfall and (*ii*) the Dholka tract with greater and more regular rainfall. The main breeding station is situated at Viramgam and simultaneously a small immune area is being maintained, under irrigation, at Jagudan to safeguard the work at Viramgam. In July 1941, it was decided to establish another sub-station at Dholka for conducting botanical work on the promising material obtained from Viramgam.

It is reported that during the year 45 families derived from crosses and selections were tested at Viramgam, Jagudan and Dholka, of which 16 promising ones were selected for further trials. Of these, four selections, E. 31-1, (1 x 99), 20-1, H. 8-1 and K. 61-3-1, were found to be early maturing, high ginning and at the same time to possess good fibre properties; the first three of these, however, are poor in respect of yield, whilst the last has a wider boll-opening than is desired in the Wagad tract. The remaining 12 families gave good yield and compared favourably with the controls in respect of other economic characters.

Varietal trials with eight close-bolled types at the three centres of experimentation did not reveal any significant yield differences. In the experiment at Jagudan, in the Lalio tract, the 'Vijaya' segregates 1-2 and 1-6 were tested against Segregate 7-1 and B. 9; the Broach segregates were found to be significantly poorer than the controls in respect of yield of *kapas* and lint.

(e) **Scheme for improvement of cotton crop in Kaira District.**—This scheme was sanctioned by the Committee in August 1939, subject to the condition that it would not come into operation until the Government of Bombay had declared Kaira district as a protected area under the Cotton Transport Act to prevent the import of inferior cotton from Nandurbar. In April 1941, the Government of Bombay issued a notification creating the Mahi-Sabarmati Zone (which includes the whole of the Kaira district) a protected area under the Cotton Transport Act, 1923; the scheme came into operation in September 1941.

Kaira district grows two kinds of cotton, (1) *G. herbaceum* var *frutescens*, popularly known as *Kanmi* and (2) *G. arboreum* var *typicum* known as *Rozi*. The former is an annual cotton of superior type and is generally grown in black soil, whilst the latter, which is found as a subordinate crop with cereals in *goradu* soils, is a perennial type, with short coarse staple and 25 to 26% ginning outturn. The area grown under these two cottons is, on an average,

78,000 acres, that under *Rozi* being 10,000 acres. Though the bulk of the cotton grown is the better *Kanmi* quality, its reputation has, of late, been spoiled by the admixture of *Rozi* cotton in the gins. The object of the scheme is to find a superior type of cotton by selection or by the introduction and trial of other perennial or annual cottons, to replace the *Rozi* type on the *goradu* soils of the Kaira district.

During the year under report, one hundred and sixteen selections were studied; of these 93 were found to be of the *Rozi* type whilst 23 appeared to be of hybrid origin. One hundred and thirtyfour single plants from both the groups were selected for further study. The trial of Broach segregates—76-1, 1-2, 1-6, 5-18, 7-29 and 3-1—showed that the yield of seed cotton per acre of the 'Vijaya' segregates 1-2 and 1-6 was, respectively, 76 and 129 lbs. more than Broach Local and 153 and 206 lbs. more than B.D.8. In respect of spinning value, the 'Vijaya' segregates were as good as B.D.8 and far superior to the Broach local and *Rozi*.

The local practice is to grow Kodra (*Paspalum scrobiculatum*) in the first year in between the rows of *Rozi* cotton and *Bajri* in the subsequent years The results of the experiment undertaken to test the effect of the local mixed cropping on the yield of cotton, confirmed the finding of the previous year that cotton with *Bajri* yields less than cotton with *Kodra*. Amongst the exotic and indigenous perennial and annual varieties tested in the tract, Nadam from Baroda and Muthukolathur is said to be promising as regards economic characters.

(f) **Scheme for interspecific hybridization in Cottons at Surat.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years, with the object of obtaining, if possible, fully fertile hybrids between Asiatic and American cottons, combining the useful agronomic characters of both, particularly the good staple length of the American and hardiness and adaptability to Indian climate of the Asiatics. Work on crossing Asiatic and American cottons, begun at Surat in 1932, had already yielded 23 hybrids in which the American parents used were mostly the acclimatised Upland types from different parts of India, while the Asiatic parents were forms of *G. herbaceum* and *G. arboreum*. The hybrids produced from these were, however, sterile and efforts to induce fertility in them were successful only when they were back-crossed to American types.

During the year under review, nine advanced cultures from three back crosses, 22, 68 and 125, were tried in randomised replicated compact family blocks against 1027 A.L.F. and Co. 2 as controls and the size of each plot was 50 sq. feet. Two cultures, B.C. 22-7-1-4F_5 and (B.C. 125 x Co. 2)-3-3. F_3, combining the characters of good yield, high ginning and long staple, are considered promising; four were high ginning and one culture—B.C. 22-7-1-3. F_5—had good staple length. It is stated that with a view to exploring the possibilities of obtaining outstandingly better combinations than has been possible hitherto, some long stapled American cottons like Meade and Cocker-wilds were used for back crossing with the F_1 hybrids. Attempts to induce doubling of chromosomes by treating the hybrids with colchicine were successful with the F_1 hybrid of *G. barbadense* x *G. Thurberi*, the treated shoots showing good setting of bolls. The synthetic tetraploids obtained by crossing hexaploids of cultivated American x cultivated Asiatic with diploids like *G. armourianum*, showed predominently the characters of the wild cotton with none of the desirable characters. The tetraploids on crossing with Co. 2 are said to have recovered a good deal in general vigour, boll size, yield and economic characters. A few plants which seemed healthier than Co. 2 were used as parents in crosses with long stapled American cottons.

(g) **Scheme for Improvement of Dharwar-American Cotton.**—This scheme was sanctioned by the Committee in July 1941, and commenced work in April 1942. The object of the scheme is to improve the Dharwar-American cotton crop grown in the Kannada districts of the Bombay Province, the adjoining areas of the Madras Province and in Hyderabad and Mysore States. This is sought to be achieved by the development, by selection or hybridisation, of an early maturing type, superior to Gadag 1 in respect of yield, staple length and ginning percentage, and which is, at the same time, more resistant to 'red-leaf' blight. The work is being done at Gadag, where conditions of soil, climate, rainfall, etc., are suited to the cultivation of *hirsutum* cottons.

During the year under review, two strains, *viz.*, 9766 and 4411, which were available from the promising material obtained as a result of hybridisation between the varieties Gadag 1 and Co. 2, were tested against Gadag 1 in a replicated trial. The results have shown that Gadag 1 is significantly better than the other two types in respect of yield but lower in ginning outturn. As regards maturity, 9766 was found to be later than Gadag 1.

SIND.

(a) Scheme for production of long staple cottons in Sind.—Ever since the opening of the Lloyd Barrage, the question of the establishment of a compact block of long staple cottons in Sind has engaged the attention of the Indian Central Cotton Committee. Although attempts in the introduction of long staple quality cottons in Sind in the past have not met with the success it was anticipated they would, the project, nevertheless, is considered to have possibilities which are well worth investigating. Accordingly, a five-year scheme for cotton-breeding investigations for the production of long staple cottons has been launched. The scheme came into operation in April 1940. The experimental stations are situated at Mirpurkhas and Oderolal. The most important problem to be tackled is to see whether high quality cottons, perferably of the American types, but possessing a better staple than Sind *Sudhar*, can be produced. The aim is to evolve a cotton longer than 1-1/16″ which would spin about 60 counts and give a high acre cash value of *kapas* relative to the commercial cotton crops now being grown in Sind. This is sought to be achieved by selecting extra long staple Upland types from a wide range of places all over the world, and, after testing them under Sind conditions, hybridising the best of them with the hardiest upland types of cotton, such as, Sind *Sudhar* and M-4, now grown on a commercial scale in Sind.

During the year under review, some 6,000 single plants belonging to the progenies of the F_2 and first back cross generation derived from the crosses between the two Sind American strains—Sind *Sudhar* and M4—with each of the six long staple Upland types imported from U.S.A., *viz.*, Express, Wilds, Delfos, Acala, Missdel and Delta Type, Webber respectively, were studied in a replicated experiment. Of the six exotic types—Wilds and of the two Sind American strains—M4, hold out greater promise of producing economic biotypes. All the six exotics were found to be more susceptible to *Tirak* and Red-Leaf blight and poorer in yield than the two Sind American strains and consequently most of the ordinary F_2 progenies showed these undesirable traits. On the other hand, all the back-crosses gave higher yields and showed lower incidence of *tirak* than the F_2s, in some cases, even equalling the two commercial strains. Plants possessing high yield, high ginning (32% and above) staple at least 3 mms. above the two commercial strains and showing only mild *tirak* attack were selected. A few plants possessing staple length

of $1\frac{1}{4}''$ with other desirable characters have also been obtained. Over 100 promising single plants will be introduced in a replicated F_3 progeny row trial in the coming season. Out of another lot of the F_2 population, 55 plants possessing a staple of 1-1/16″ and over, were introduced into a replicated F_3 progeny row trial. Though the growth, vigour and productivity of the crosses were satisfactory, the bolls developd *tirak* to a very high degree and consequently the yield per plant was considerably reduced. It was, therefore, not possible to obtain a valid estimate of the inherent yielding capacities of the hybrid progenies tested in this experiment. The crosses were superior to Sind *Sudhar* in ginning outturn also. A large number of promising progenies will be further tested in a replicated trial in the ensuing season.

(b) Scheme for Cotton Jassid Investigation.—In Sind, jassid attack is most prevalent in the south-east Tharparkar district where it is proposed to establish a compact block of long staple cotton. One of the harmful effects of this pest is improper development of the seed, so that, in certain seasons, good seed is not available for sowing purposes, and this gives a setback to the extension of improved varieties. Accordingly, in August 1937, the Committee sanctioned the above scheme, for a period of three years and six months, with the object of studying the habits of jassids their alternative hosts and the manner in which certain varieties of cottons resist jassid attack. In January 1941, the scheme was extended up to 18th April, 1945. The progress made during the period under review is described below :—

During the year under review, the incidence of jassid infestation is reported to have been more intense than in the previous year but it was not serious. Six varieties, *viz.*, Sind Sudhar, M_4, L.S.S., SLDI, Co. 4 and K. 25, were tested for jassid susceptibility. On the basis of the number of jassids attracted, M4 was found to be the most resistant and Sind *Sudhar* and 289F/K. 25 the most susceptible, the rest occupying intermediate positions. This classification, however, was not corroborated by field observations on the development of the symptoms of damage. Co. 4 showed the least symptoms, notwithstanding its greater attractiveness to the jassid, while M4 developed comparatively more intense symptoms in spite of fewer jassids being attracted to it. The infestation of the crosses and back-crosses with S. S. and M4, raised in the long staple cotton scheme, did not differ significantly from one another.

The seasonal sowings are reported to have confirmed the observation of the previous year, *viz.*, that the late sown crop is more heavily infested

by the insect. There was no evidence, however, to show that heavy infestation reduces yield. Examination of the hairiness, and the anatomical peculiarities of the leaf vein indicated that the injury caused by the jassid is apparently not due to the destruction of plant cells by the pest, and that the density of hairs on the veins confers resistance to jassid attack.

It is reported that the different spacings—2, 3 and 4 feet between the rows—did not produce any significant difference in the jassid population. Unlike the Punjab, zones of differential jassid infestation do not appear to exist in Sind. *E. Devastans* is said to be the main species of jassid of any importance so far as Sind-American cottons are concerned.

(c) Scheme for co-ordination of Research on Black-headed Cricket in Sind and Baluchistan.—The scheme for investigation into the black-headed cricket in Sind was sanctioned by the Committee in January 1938, for a period of three years, with the object of establishing the identity of the pest and studying its life history, seasonal behaviour and the extent of the damage caused by it. Before the opening of the Lloyd Barrage, the Black-headed Cricket had been known as an occasional pest of Sorghum and cotton in Upper Sind and some parts of the Punjab. With the introduction of cotton cultivation on the Right Bank of the Indus, however, this insect has become a serious pest of cotton in the seedling stage in Khirtar and Johi tracts in Sind and in some parts of Baluchistan. The pest appears in the cotton fields towards the end of April and disappears in June. The period of its activity synchronises with the sowing time of cottons and causes almost wholesale destruction of the crop. The pest appears to belong to the same species as met with in Baluchistan, *viz., Gryllulus domesticus*. Since April 1941, the scheme has been merged in the scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan.

The objects of the co-ordinated scheme are (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures and (3) to control and prevent the ravages of the pest by means of poison baits.

The Baluchistan part of the above scheme has been dealt with elsewhere.

During the year under review, the control work was carried out on the lines of the previous years. Owing to extensive *rabi* cultivation on the flooded

areas, the incidence of the pest is reported to have been very high in Sind and severe damage of grain in the threshing yards was observed. In parts of Dadu district where the pest used to appear regularly every year, there was little or no cotton cultivation. The bait material was distributed from four centres for controlling the pest in threshing yards and cotton fields in the other parts of the district. Cotton is said to have been sown on about 300 acres in Khirtar area of Larkhana district and this area was also cleared of the pest. Besides this area cotton was not grown anywhere else in this tract. It is stated that 10 to 20 seers of the bait are sufficient, according to the intensity of incidence, to control the insect in one acre.

It is reported that a complex sowing date cum varietal experiment was laid out at Shahdadkot in Sind and Ustamuhammad in Baluchistan. The trial at the former place was destroyed by floods in August last. In the test at the latter place, three varieties, *viz.*, 4F-98, Sind *Sudhar* and M4, were planted each on 4 different dates—27th April, 15th May, 27th May and 15th June, 1942. The early sowings in April are stated to have given the best results in the case of all the three varieties; M4 matured earlier than the other two types. Ridge sowing of cotton was found to minimise the damage by *tid*, but this method of sowing is considered expensive. Trials carried out to find out a cheaper and a more suitable poison bait have indicated that rice bran and molasses, now being used, cannot be replaced. The experiment will be repeated.

(d) Scheme for bollworm investigation and clean-up campaign in Sind.—This scheme was sanctioned by the Committee in January 1940, for a period of 3½ years, and it came into operation on the 1st September, 1940. The work proposed to be carried out under the scheme durng the first seven months was (*a*) to survey the host plants during the off-season of cotton and (*b*) to test the efficacy of the implements evolved elsewhere. During the remaining period, it is proposed to carry out a clean-up campaign and to study its effect on the succeeding year's crop. The investigations are confined to the Tharparkar district.

During the year under review, the campaign area was increased to 700 square miles from 570 sq. miles in the previous year, by the inclusion of 130 sq. miles in the rice tract where the bollworm attack was most severe. As in previous years, the clean-up operations were undertaken in December and completed by the end of February, during which period 98.8% of the area

was cleaned, 93% of this being by means of *kudali* and 7% by the hatchet. The eradication of *patiteer* and other alternative host plants was also completed within the same time.

The study of the incidence of the bollworm in the cleaned and uncleaned areas revealed that while the cotton seedlings in the former area were practically free from the pest, those in the latter were infested to an appreciable extent. A later examination of the crop at the fruiting time of cotton showed that the bollworm attack in the uncleaned areas of the cotton zone, the area growing partly rice and partly cotton and the zone where rice predominated, was 2-3 times or 3-5 times greater than in the respective cleaned areas. The average attack in the uncleaned area of the rice tract was as high as 41.7%.

The night caging experiments indicated that the difference in yield between the caged and non-caged plants was more marked in the untreated area than in the treated area. On an average, five bolls more per plant were picked in the cleaned areas than in the uncleaned.

It is stated that in the absence of any rigid measures of control over a number of years, the rice tract would serve as the breeding ground for the pest and a total or partial failure of the cotton crop in the Hyderabad and Tharparkar districts might result.

PUNJAB.

(a) **Punjab Botanical Scheme.**—This is one of the earliest schemes of the Committee. Sanctioned in 1923 for a period of five years, it came into operation in August 1925, and has been extended from time to time, the last extension, which will expire on the 28th February, 1945, being approved by the Committee at its meeting held in January 1940. Until 31st March, 1936, the entire cost of the scheme was borne by the Committee, but since then, the expenditure is shared on a 50 : 50 basis between the Committee and the Provincial Government. The original object of the scheme was to investigate the causes of the periodic failures of American cotton in the Canal Colonies of the Punjab where a large area is annually grown under such cottons, and to obtain suitable types of American and *desi* cottons. In view, however, of the immediate economic importance of improved types of cotton, work was concentrated on breeding, and a separate physiological scheme was sanctioned for investigating the problem of periodic failures of American cotton. The Botanical scheme has thus been concerned mainly

with the improvement of both *desi* and American cottons. As more than half the cotton area in the Punjab lies in the Canal Colonies, attention was first directed to the improvement of the cottons of that area. The South-Western tract of the Province, comprising the arid districts of Multan, Muzaffargarh and Dera Ghazi Khan, were given attention next and a sub-station for this purpose was opened at Multan in 1935.

During the year under review the total area under cotton in British districts was 2,331,700 acres, of which 1,575,400 acres were under American and 756,300 acres under *desi* varieties.

The newly selected cultures from the improved varieties, 289F/43 and L.S.S., were tested in randomised and replicated blocks ; three high ginning and good yielding selections—233F, 234F and 238F—from the former and five early maturing progenies—263F, 264F, 265F, 266F and 267F—from the latter have been retained for further study.

The district varietal trails carried out during the year confirmed the superiority of the new American strains—124F and 199F—over the commercial varieties now under distribution. 124F is said to be increasing in popularity in the lower Bari Doab Canal Colony and south-west Punjab and occupied roughly an area of 13,000 acres during the first year of its release for distribution. The second strain, 199F, is reported to be even more promising than 124F ; it surpassed other varieties in most of the centres where it was tested for yield, staple length, ginning outturn and acre cash value. It is stated that this variety with its cosmopolitan habit may be found suitable for all the American cotton growing regions of the Punjab.

The F_3 of 19 progenies from two different backcrosses—(920 Cambodia x 58F) x 289F/43 and (920 Cambodia x 58F) x 124F—were tested for jassid resistance and a large number of single plants has been selected for study in the coming season. Amongst the *desi* hybrid strains, Jubilee was found to be highly promising at Risalewala and Lyallpur and is said to be particularly suited to the Lyallpur Colony.

At the Hansi sub-station, one set of five new *desi* strains and another set of nine American varieties were tested in replicated experiments against Mollisoni 60A2, which is now under extensive cultivation in the south-east Punjab. Amongst the *desi* selections, 231 Rosea was better than the Control in respect of yield and ginning percentage ; of the American varieties, 216F, 124F, 157F and 199F gave significantly higher yield than Mollisoni 60A2.

At the Jhang station the yields of 199F and 224F are reported to have been statistically on a par with 4F.

(b) Scheme for improvement of Punjab-American 289F/K. 25 cotton.—This scheme was sanctioned in January 1938, for a period of five years and commenced work from the 9th July 1938. The object of the scheme is the improvement of 289F/K. 25 cotton which was evolved at the B. C. G. A. Farm some years ago. Though this strain is very popular in the Lower Bari Doab Canal Colony and the area under it has expanded very rapidly, it suffers from the defect of susceptibility to jassid attack. One of the aims of the present scheme, therefore, is to develop jassid-resistant strains from this cotton.

The incidence of jassid and *tirak* during the year was negligible and the yields obtained were consequently high ; the crop at the B.C.G.A. Farm gave an average yield of 16·17 maunds of *kapas* per acre against 9·86 maunds in 1941-42. There was practically no difference in respect of yield between the mass selected strain and the B.C.G.A. strain ; the former was, however, significantly superior in ginning outturn. Of the 220 single plant progenies in the row test, five selections, combining the desirable characters, have been retained for further testing. Amongst the hybrid families under observation, ten from 289F/K. 25 x 289F/43 and its back-cross and one from the cross between 124F x 4F Sakrand (a jassid resistant variety) appeared promising in respect of jassid resistance, ginning percentage and lint length and it is proposed to test their yielding capacity in the coming season. With a view to creating fresh hybrid material for the isolation of jassid resistant types, the new Cambodia strains—Co.3 and Co. 4—were crossed with 289F/K. 25 at Lyallpur and the first generation hybrids will be grown at Khanewal in the ensuing season.

Varietal tests of American strains evolved at Lyallpur and Multan, conducted at Khanewal, showed 124F and 199F to be superior to 289F/K. 25 in respect of yield ; the differences, however, were not statistically significant. The average yield per acre of 124F from a plot of 16 acres on the Khanewal farm was 23·5 maunds.

(c) Physiological Scheme.—Partial failures of the American cotton crod in the Punjab occurred in the years 1919 to 1921, 1926 to 1928, 1931 and 1932. The external symptoms of the cotton plants during these failures were early reddening and shedding of the leaves, premature opening of the bolls with immature seeds and low quality lint and, in extreme cases, the dwarfing of

the plants. To account for these failures, various views were advanced, such as the heat stroke theory (Milne, 1924), attack of White Fly (Roberts, 1929) and unfavourable combination of climatic and biotic factors (Trought, 1931). As, however, these theories could not be supported by sufficient data, it was thought that the failures might be due to malnutrition of the plant and a physiological scheme was accordingly started by the Committee in March 1935, to study the physiology of the cotton plant with a view to determining, if possible, the nature of the nutritional disorder, its causes and the measures necessary to combat it. The scheme started work in 1935. In March 1937, the Empire Cotton Growing Corporation loaned the service of Dr. Mason to the Committee to inspect and report on the scheme and, on his recommendation, a soil survey on a large scale was undertaken to connect up soil conditions with cotton failure. The scheme is due to terminate in March, 1944.

The work done so far has indicated that two sets of soil conditions are associated with the development of '*tirak*,' *viz.*, (*i*) soils with saline sub-soil and (*ii*) soils with nitrogen deficiency. These conditions may exist separately in separate fields or together, the intensity varying from field to field.

The growth of plants is normal, in the earlier stages of development on both the soil types. From the flowering stage the plants on light sandy soils deficient in nitrogen are characterised by yellowing and reddening of leaves followed by premature defoliation. The leaves of the plants on soils with saline subsoil exhibit drooping from the middle of August onwards. Wilting becomes more and more accentuated with the advance of time after every irrigation. The leaves do not turn yellow before they are shed.

The association of a chemical substance giving tannin reaction with the deficiency of nitrogen is another important finding which serves as a biochemical index of nitrogen starvation. By subjecting the water-extract of a few bits of cotton leaves to 'tannin test' in August, it is now possible to forestall whether the cotton crop in a particular field requires application of nitrogenous manure or not. If the 'tannin test' is positive nitrogen applications will prevent the development of '*tirak*' on light sandy lands.

Extra water at the fruiting stage has been found to ameliorate '*tirak*' and give increased yield only on soils which are saline in the subsoil. Additional water supply will not, however, have any appreciable beneficial effect on light sandy soils where '*tirak*' is caused by nitrogen deficiency. Similarly

applications of manure will ameliorate '*tirak*' on light sandy soils but not on soils possessing saline subsoil. In order to obviate the difficulty experienced in distinguishing the soil types and deciding upon the correct remedy, a common ameliorative measure for the two abnormal conditions has been devised. It consists in delaying the sowing of cotton in general. The optimum period for sowing American cotton has been indicated to be in the month of June rather than in May. There was a substantial improvement in the opening of bolls in respect of late sowings irrespective of the soil types.

When sowings were done in June, the number of bolls per plant was reduced, affecting the yields adversely even though '*tirak*' was ameliorated. This disadvantage that accompanies late sowings is counteracted by sowing the rows at 2 ft. instead of at 3 ft. and by reducing the distance between plant to plant. This practice would increase the number of plants per acre and a reduction in boll number per acre will be avoided.

June sowings do not suffer from a decrease in yield on normal fertile lands which are neither deficient in nitrogen nor are saline in the subsoil. Thus June sowings can be practised as a general measure to combat '*tirak*' in spite of the great heterogeneity of Punjab soils.

During the year under report, the results obtained from the field experiments confirmed the previous finding that June sowing is the best practical ameliorative measure against *tirak* and closer spacing than the one usually adopted is necessary for obtaining higher yields. June sowings did much better than May sowings on rice-reclaimed areas. Two schedules, A and B, have been prepared on the basis of experiments conducted during the past few seasons. Schedule A furnishes particulars about the changing seed rates and spacings with advancing dates of sowings. Schedule B contains the optimum sowing periods for the commonly grown varieties in each district. The previous finding that June-sown crop, if spaced closely, suffers less damage from jassids than if spaced widely has again been confirmed for the 3rd year in succession. The new strain (289F/124) was found particularly suitable for June sowings in Multan and Montgomery districts. When sown in May it was affected by *tirak* but later sowings showed little or no *tirak* and gave very high yields when closely spaced. It is proposed to include 289F/124 amongst the varieties recommended for these two districts. June sowings were adopted by private *zamindars* on a large scale in 1942. On a majority of these farms record yields were obtained. On some of these farms the yields

of May-sown and June-sown crops were recorded separately and in all cases, except one, June-sowings out-yielded May-sowings.

The study of the physiological chemistry of *tirak* affected plants has shown that nitrogen influences the boll number per plant while potassium affects the seed maturity. The deficiency of potash in the bolls of *tirak* affected plants is found to cause immaturity of seeds by adversely affecting the synthesis of proteins. On light sandy soils potassium deficiency occurs as a result of nitrogen deficiency. The uptake of potash by plants has found to increase when sulphate of ammonia was added to light sandy soils. On soils with saline sub-soils the condition of physiological drought brought about a depression in the potash uptake. The net result is stated to be the same on both soil types, *viz.*, immaturity of seeds, though there are differences in the symptoms exhibited.

During the year a date of sowing experiment with Sea Island cotton was tried. The Sea Island cotton was sown in March, April, May, June and July. The results indicated that March-April was the optimum sowing time for this variety. The following table gives the yields obtained at Iqbal Nagar for the different sowings.

Sowing date.	The effect of sowing date on yield of Sea Island cotton.					
	28th March.	18th April.	8th May.	28th May.	18th June.	10th July.
Yields in maunds per acre ..	11.03	12.05	9.4	3·02	Not bearing at all.	
			S. E.	0·75		

The experiment conducted with oil cakes and the sulphate of ammonia on light sandy soils indicated that *toria* cake could successfully be substituted for ammonium sulphate as it gave nearly as great increases in yields as the sulphate of ammonia. The cotton cake did not give sufficient increase in yield either at Lyallpur or at Iqbal Nagar.

(d) Root Rot Scheme.—This scheme, which was sanctioned by the Committee in 1932, is concerned with the investigation of the cause and control of root rot in the Punjab, where, particularly in the canal irrigated areas, the annual damage done to cotton by this disease is estimated at several lakhs of rupees. Both *desi* and American varieties are equally affected by the disease

which makes its appearance towards the end of June and continues up to the middle of September. The organisms responsible for the disease are *Macrophomina phaseoli* and *Corticium solani*. The scheme terminated on the 28th February 1942.

As a result of the investigation carried out, it was found that the simplest method of control of root rot in affected fields is to sow cotton mixed with *moth* (*Phaseolus aconitifolius*). The *moth* crop forms a thick mat on the bare ground in the rows between the plants and has proved very effective in reducing the incidence of the disease to a very great extent. In certain cases fields affected as severely as 80-100% were found to bear a cotton crop absolutely free from the disease when grown in this manner. It is stated that the Punjab Department of Agriculture is now recommending *Moth* sowing in fields known to be affected with root rot.

(e) **Cotton Jassid Investigation in the Punjab.**—This scheme is concerned with the study of the Jassid insect in the Punjab, as regards its habits, alternative host plants and characters of the cotton plant which determine resistance to the pest.

Though jassid infestation during the season under review was less severe than in the previous year, it is considered to have been of sufficient intensity to enable a correct evaluation to be made of the differences in varietal resistance. Among the new types tested in randomised blocks, 124F was found to be most susceptible and 199F the most resistant; in view of this and its good field performance and technological properties, 199F is expected to become the most important commercial variety of American cotton in the Province in the near future. As regards the commercial varieties, the previous findings that 289F/43 was very resistant while 289F/K. 25 was highly susceptible, were confirmed.

The study of the relative importance of the species of *Empoasca* as pests of cotton revealed that *devastans*, which predominated at all the places, is the main species responsible for the damage in cotton; the other species, *viz.*, *Kerri*, var *motti* and *minor*, though abundant in certain localities, do not affect cotton to any great extent. The investigation of jassid resistant characters such as moisture content, hairiness, pH of cell sap, thickness of leaf vein cuticle etc. indicated that resistance is closely linked with the density of hairs on the leaf vein.

The addition of Selenium to plots of 289F/K. 25 enclosed in a field cage and infested artificially with jassids, made no improvement in the resistance of the variety.

(f) Scheme for study of nutritional values in relation to milch buffaloes of fuzzy cotton seed and cotton seed cakes manufactured from such seeds in the Punjab.—This scheme was sanctioned by the Committee in January 1942, for a period of two years. It came into operation on the 1st September 1942.

The object of this scheme is to investigate the alleged disparity in nutritive value of *desi* and American cotton seeds, with a view to ascertaining whether the differences between the market prices of *desi* and American cotton seed is due to prejudice or to inherent differences in their feeding value.

The investigation was carried out with 12 buffaloes, which were divided into 3 groups, A, B, and C with four animals in each. Group A was fed on fuzzy American cotton seed 289F/K. 25, group B on delinted American cotton seed 289F/K. 25, and group C on *desi* cotton seed. The animals were each given daily as much cotton seed as they could eat, in addition to other fodder and one lb. each of ground gram and wheat bran. The buffaloes in group A ate regularly about 6 lbs. per head per day, throughout the period, and those in group C about 8 lbs., of the four buffaloes in group B, two ate 8 lbs. and the other two 4 lbs. All the animals, except one which died after 4 months, are reported to have maintained normal weight, health and yield of milk.

The results obtained to date indicate that in so far as the quality of the milk, *ghee* and butter produced from the group, fed on fuzzy cotton seed is concerned, there is no distinguishable difference in characteristic taste or palatability from similar products from the buffaloes fed on ordinary rations. In fact, the experiments have confirmed the previous finding that the food value of fuzzy cotton seed is higher than that of other cotton seed.

CENTRAL PROVINCES AND BERAR.

Central Provinces and Berar Cotton Breeding Scheme.—The Central Provinces and Berar Cotton Breeding Scheme was sanctioned by the Committee for a period of five years with effect from the 1st April, 1939, and replaced the Central Provinces Botanical Scheme which terminated on the 31st March, 1939. The object of this scheme is to evolve, by selection or hybridisation, suitable new strains of cotton which can compete successfully with the local *Oomras* in point of ginning outturn and yield and which, at the same time,

possesses a staple capable of spinning between 20s and 25s highest standard warp counts. The scheme is worked at Nagpur and at Akola, to suit the special requirements of the Central Provinces and Berar, respectively.

The Central Provinces Cotton Breeding Scheme is concerned with the breeding of improved strains of cotton suitable for Nagpur, Wardha, Chanda and parts of Chhindwara districts and capable of replacing the ordinary short staple mixed cotton of these areas. The scheme at Akola is concerned with the production of high-yielding superior strains of cotton suitable for the Berars and possessing a staple of at least $\frac{3}{4}$", with the softness, colour and strength of V. 434 and a ginning percentage above 33. Breeding of high ginning new strains of Buri cotton for the Burhanpur *tahsil* also forms part of this scheme.

A considerable increase in the area under American cottons is reported to have taken place both in the Central Provinces and in Berar. Buri 107 covered an area of 155,399 acres, the area in the Burhanpur *tahsil* alone being 49,409 acres. The total area occupied by Cambodia cotton in the province was about 347,828 acres. Buri 107 gave an outturn of 512 lbs. per acre on the Nagpur farm and 453 lbs. per acre on the Akola farm.

During the year under review, V. 434 was grown on an area of 6.62 lakhs acres in the Central Provinces and Berar against 4·10 lakhs acres in the previous year. It is reported that the spread of *Jarila* has been even more remarkable, the area of 2.74 lakhs acres under it in 1941-42 having increased to 13.68 lakhs acres in 1942-43. On the Akola farm, V. 434 and *Jarila* gave on an average 354 lbs. and 302 lbs. per acre respectively. The performance of H. 420 is stated to have been highly promising ; not only did it withstand water-logged conditions well but it gave an outturn of 451 lbs. per acre on the farm, which is 149 lbs. and 97 lbs. more per acre than the yield of *Jarila* and V. 434, respectively.

Districts trials were carried out, as in the previous years, with H. 415, H. 420, V. 434, *Jarila* and Local *Jadi* in 31 different places in the Central Provinces and 34 representative localities in the Berars. The results showed that in respect of yield, H. 420 is on a par with Local *Jadi* in the Central Provinces ; on the cultivators' fields in Berar neither H. 415 nor H. 420 was better than Local *Jadi*. The H. strains—420 and 415—were adjudged suitable for spinning up to 27's highest standard warp counts against 23's of V. 434. The demand for the seed of H. 420 is said to have been very great.

MADRAS.

(a) **Pempheres Scheme.**—This scheme, as originally sanctioned and started in 1931, consisted of two investigations, one for the cotton stem weevil (*Pempherulus affinis*), and the other for the evolution of a strain in *Karunganni* cotton, resistant to the harmful effects of February rains. The second investigation was terminated in 1938 as the experimental work had been brought to a stage when further work could be continued by the Agricultural Department itself. The problem of the control of the cotton stem weevil was pursued in three directions, botanical, biochemical and entomological. In 1938, when the work was reviewed, it was felt that the latter two aspects could be stopped and the former one, *i.e.*, the botanical aspect, could be pursued as indications were obtained to the effect that quicker and more tangible results could be secured by concentrating attention on the breeding side. Work was confined during the year under report to this aspect only.

Two generations of plants were raised during the year under report, one in the summer months at Srivilliputhur and the other in the cool season at Coimbatore. At the former centre, 22 promising cultures selected in the previous year were tested in replicated preliminary yield trials against Co. 3; of these one was significantly better and four others equal to the control in respect of yield. The superior strain was, however, found to be susceptible, but two of the equal yielders, derived from X-102-2-4, combined high resistance with the desirable economic characters of good staple, high ginning outturn and early maturity; their only defect was the smallness of the bolls. At the Coimbatore centre, 60 cultures were tested against two strains, Co. 2 and 4463. Judged from the results, the derivative X-82-1-5 from the cross, 7178/1 x 4463, alone was found to possess the desirable combination of characters. The progenies of the strain, X-102-2-4, which looked promising at Srivilliputhur in the summer season, proved to be both susceptible and poor yielders under Coimbatore conditions.

The experiment to study the effect of crop mixtures on pest incidence was repeated both in the summer and the cold weather. The results of the summer trial showed that mortality of cotton was the lowest in cotton-*tenai* mixture, but *tenai* was found to affect the growth of cotton adversely. *Ragi* is considered a more desirable millet for cultivating in association with cotton. Further experiments with cotton-*ragi* mixture during the cold season at Coimbatore indicated that there was no differential response to pest incidence.

(b) Scheme for Improvement of Mungari Cotton in Madras Province.— This scheme was sanctioned by the Committee in 1937 and has for its object the evolution of strains suitable to the red soils and combining the quality of the *Westerns* with the yield of *Mungari*, to replace the inferior *Mungari*, the existence of which affords opportunities for mixing, with the result that the better cottons of the tract fail to get their proper value. On the black soils of Anantapur, Bellary and Kurnool districts of the Madras Province, cottons commercially known as *Westerns* and *Northerns* are grown. These are medium staple varieties, capable of spinning 24s to 32s. The type of cotton grown on the red and mixed soils, on the other hand, is that known by the name of *Mungari*, which is a coarse, short staple variety, similar to *Bengals*, and not fit to spin more than 8s or 10s. The co-existence of these widely different varieties in the same tract favours undesirable mixing, with the result that the better cottons suffer in value. It is to overcome this difficulty that the Mungari scheme was started.

During the year under review, the yield trials conducted on the red and light black soil areas showed that H. 1 variety was on a par with the local in respect of yield on both types of soil. Judged from its past performance, 6042, though late maturing in habit, is considered to be the most desirable type. It is proposed to confine yield tests in the ensuing year to 6042, H1, 882, *Jarila* and local. Of the district trials, which were programmed to be conducted at 12 centres in the districts of Anantapur, Bellary and Kurnool, seven could not be carried out owing to unfavourable seasonal conditions. Of the remaining five, one had to be abandoned on account of poor growth of the crop, while the results from another were not statistically significant. The trials have shown, however, that V. 434 and Co. 4 are unsuitable for late sowing and that 6042, 882 and P. 710 are the best of those tested. *Jarila*, owing to its earliness, is considered to be suited to the *Mungari* tract ; in one of the experiments it was found to be as good as the local in respect of yield but further testing is considered necessary before it can be recommended for cultivation in the area.

Of the hybrid cultures under trial, the most promising types, combining a staple of 24 mm. with 33% ginning outturn, were derived from the cross between *Mungari* selection, M. 3 and Parbhani type P. 26-4. The cultivation of V. 434 and Co. 4 as a mixed crop is stated to have shown no differences either in the degree of incidence of the small leaf disease or in respect of yield

compared with the local variety grown singly. Two hundred and twenty-four varieties were tested with the object of determining their susceptibility or otherwise to the small leaf disease, of these 45 did not develop the symptoms. It is stated, however, that no safe conclusions can yet be drawn, as, owing to late sowing, the incidence of the disease was low. Further trial, during the season, with cucumber belt as a measure of control against the red hairy caterpillar, did not yield any definite results.

(c) Scheme for Improvement of Cocanadas cotton in Madras Province.—

This scheme was sanctioned by the Committee in November 1938, for a period of five years. The work was started from 1st February, 1940. The object of the scheme is to improve the yield and ginnnig percentage of Cocanadas cotton, preserving at the same time the light pinkish colour of its lint owing to which it is in great demand for the manufacture of dyed yarns.

As the Cocanadas cotton is cultivated on both black and red soils, arrangements were made to sow the seed material at two places, *viz.*, at Narasaraopet to represent the red soils, and at the Agricultural Research Station, Guntur, for black soils.

Colour improvement being one of the objectives of the scheme, greater attention was paid to investigate the limits of variation in the different standard lint colour grades. Seeds of plants representing five standard grades were sown in six agricultural research stations. When the *kapas* of each plant was analysed, it was observed that grades 2 and 3 were not different from one another. Grades 4 and 5 were likewise similar. All the above four grades showed dilution in colour, the dilution being greater at Coimbatore than at other places. It was further noticed that the colour was not influenced by the time of sowing and that wide variations were present in the colour of the lint produced on the same plant even after removing the effect of exposure. Studies of the effect of exposure showed that all grades except No. 1 deepened in colour within certain limits peculiar to each grade. It was clear from the observations that the standard grades needed regrouping based on the ranges of variation in each, and that the upper limit of improvement of lint colour in Cocanadas cotton by the method of single plant selection could only be grade 3. Further intensification in colour is possible only by crossing it with imported varieties. It is stated that amongst the Asiatic cottons the highest grade of lint recorded so far was 5, while in the Americans the depth reached grade 7. Arrangements were made to cross the standard strain in the Co-

canadas variety, *viz.*, x20 with higher grades up to 5. Besides, a Cambodia strain having lint of grade 1 was crossed with cottons of grade 6 and 7 with the object of evolving a type of American cotton suited to the red soils of the tract. The studies also indicated that it would be necessary to determine whether the lint colour standards used by the trade were the result of genetic or environmental factors. Such a clarification would be necessary since, in case the former set of factors was found responsible for deeper colour, it would not be possible to combine lint length and colour owing to the negative correlation existing between them.

During the year under report, eight hundred and fifty-six cultures from deep lint colour group and one hundred and seventeen selections from light coloured progenies were tested in replicated row tests. Fifteen cultures recorded better yields than x20 and all hybrid selections were shy yielders. Among the prolific list of cultures, 123, 129 and 805 possess colour and ginning. In the other promising one character types, 1386 and 1626 may be particularly mentioned. The variability in bulks and progeny rows indicate that types possessing single attributes of 30 mm. length, 38% ginning and colour grade 3, can be selected and purified.

The colour problem has been practically solved and all selections in row yields are of a colour grade equal to the reputed Palnad standard. Profound environmental effects on the main lint characters were observed. Differences in ginning percentage between July and August are wider than those between August and September.

The environmental studies on lint colour have yielded valuable information on the influence of place and season on colour shade and with this knowledge revised standards have been proposed.

Messrs. Volkart Bros. and Ralli Bros. who are buyers of Cocanadas cotton are reported to have been consulted as to what in their opinion constitutes a good sample of this cotton. According to Messrs. Ralli Bros. the property required to be maintained is the power of absorbing dye; the colour is a secondary matter, since only a fraction of the consuming mills prefer it; the desired staple length is between 0.80″ and 0.82″. All the progenies under yield trials are said to possess this minimum lint length. Samples have been sent to the Committee's Technological Laboratory for carrying out tests on dye absorption.

UNITED PROVINCES.

The United Provinces Botanical Scheme.—This scheme was sanctioned by the Committee in 1938 for a period of five years. The object of the scheme is (1) to develop improved strains of Bengals cottons, for the rain-fed and irrigated tracts of the United Provinces, from the material collected in the course of the survey of cottons in Rohilkhand and Bundelkhand, (2) to test the suitability of the United Provinces improved cottons—C. 402, C. 520 and Perso-American—against local and other promising introductions, both on Government farms and cultivators' fields, and (3) to investigate the possibilities of American cottons under the United Provinces conditions.

The area under cotton in the United Provinces, during the year under review, was 309,161 acres against 428,620 acres in 1941-42 and the total production was 90,749 bales compared with 105,445 bales last year.

The work on breeding of improved varieties was carried out at Cawnpore, Raya, Nagina and Belatal research stations representing the Central, Western Rohilkhand and Bundelkhand cotton growing tracts of the province. Seven strains including A and D, isolated from the original survey collections, were tested against C. 520 at all the four research stations in replicated trials. At Cawnpore, the strains 35/6, 35/3 and 35/1 gave significantly higher yield than the Control; at the other three centres, the differences in yield were not significant. It is stated that 35/6 at Cawnpore, 34/4 at Raya, 36/5b at Nagina gave, on the basis of acre cash values, Rs. 59, Rs. 9 and Rs. 39 respectively over C. 520.

In the district trials conducted under irrigated conditions at 10 centres, C. 520/2 significantly outyielded C. 520 at three centres and D at one centre. The performance C. 402/8 and Perso-American was poor. Under irrigated conditions, the average yield of strain D was found to be the highest. It is reported that the increased profit realised from the improved strains—A, D and C. 520/2 over C. 520, was about Rs. 37, Rs. 18 and Rs. 9 respectively. Strain D is said to have given a higher acre cash value than C. 520 for the fourth year in succession.

Replicated experiments designed to study the behaviour of certain Punjab-American varieties—L.S.S., 289F, N15, 100F and 83F—in comparison with Perso-American and C. 520, under the United Provinces conditions, were conducted at five farms. L.S.S. and 100F were found to be the best in respect of yield,

confirming the previous year's observation regarding the likelihood of the Punjab-American varieties giving a higher profit than Perso-American. These results have opened up the possibility of breeding a long stapled cotton, capable of spinning 35s to 40s, against 30s of Perso-American.

BENGAL.

(a) **Scheme for cultivation of long staple cotton in Bengal.**—The object of this scheme is to test the possibilities of introducing long staple cottons in the well drained highland soils of Bengal. It is financed jointly on a 50 : 50 basis, by the Provincial Government and the Bengal Millowners' Association and it came into operation in April 1938. In January 1941, the Indian Central Cotton Committee agreed to provide a supervising officer for the scheme for a period of two years. In addition to supervising cotton cultivation work at the different centres, the officer will also undertake botanical work.

The season in the past year is stated to have been favourable for cotton in the Eastern and Northern parts of the Province; on the Western part, however, as the result of a cyclone in October last, the experimental plots in the Midnapore farm were washed away and no produce from them could, therefore, be collected.

Six varieties, *viz.*, D. 289F, D. Co. 2, D. Parbhani, D. Buri, D. Dharwar and D. Kampala, were tested during the year in a randomised and replicated experiment. The size of each plot was 1/60th acre. The boll opening in D. Parbhani and D. Kampala was good but in D. 289F, it was bad. D. Kampala and D. Dharwar gave the highest yields, *viz.*, 661 lbs. and 645 lbs. per acre, respectively, against 540 lbs. of D. Parbhani and 561 lbs. of D. 289F. The differences in the yields of the six varieties were, however, not statistically significant. The results of the sowing date cum spacing experiment, tried during the year for the first time, showed that the sowing on 15th May spaced either 4′ × 2′ or 4′ × 3′, was significantly better in respect of yield than later sowings and wider spacing. It is proposed to repeat the experiment in the ensuing season.

Cultivation trials were undertaken, as in the previous year, at six centres; of these, three were badly affected by the cyclone while one had to be abandoned owing to the indifference of the cultivator. At the remaining two centres—Ghoraghat and Badkulla—43 and 50 *bighas* were sown and D. Parbhani is reported to have given on an average 740 lbs. and 620 lbs. of

kapas per acre, respectively. Co. 3, which was included in these trials, gave at Ghoraghat more than 850 lbs. of seed cotton per acre.

(b) Comilla Cotton Scheme.—This scheme was sanctioned in February 1933 and came into operation in December 1934. It is concerned with the improvement of the commercial characters of *cernuum* cotton by the isolation of coarse, high ginning and good yielding strains suitable for mixing with wool. In view, however, of the apparent absence of *cernuum* cotton and predominance of *neglectums* in the tract, it has been decided to extend the breeding work to the *neglectums* and to find out whether useful ecotypes suitable for Chittagong hill tracts can be isolated from the *cernuum* collection obtained from the Garo hills of Assam. The scheme terminated on 31st March, 1943.

The scheme has yielded seven improved, high ginning strains; of these, strain 9(1) is considered to be the best in respect of ginning percentage (47·1% against 42·06% of the local) and yield of seed cotton. A very large number of cotton samples, about 15,000 to 16,000, was collected during the survey of the hill tracts of Chittagong, Lushai, Garo, Naga and Jayantia and examined for their economic characters. Since the entry of Japan into the war, and the closing of the best market for "Comillas" the price of this cotton has gradually dwindled to Rs. 2 to Rs. 3 per maund from the pre-war rate of Rs. 10 to Rs. 12 per maund.

BALUCHISTAN.

Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan.—The scheme for the control of Black-headed Cricket in Baluchistan was originally sanctioned in August 1939, for a period of two years, to run concurrently and in co-ordination with the scheme for investigation into the Black-headed Cricket in Sind sanctioned by the Committee in January 1938. The combined scheme for the co-ordination of work in progress in Sind and Baluchistan was sanctioned in January 1941, for a period of three years from the 1st April, 1941. The objects of the scheme are: (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures, and (3) to control and prevent the pest by means of poison-baits.

The control work in Baluchistan consisted in preventing the migration

of the pest from the strip of land known as 'Pat' along the Khirtar Canal, by destroying the insects at the canal bridges. In addition, poison-baits were extensively distributed in 16 villages in the Usta *tahsil*. It is stated that the *zamindars* have become 'tid minded' but that their attitude is still one of expecting free help from Government.

HYDERABAD.

(a) **Botanical Research Scheme.**—The object of this scheme, which was sanctioned by the Committee in 1929, is to study the several varieties of cotton grown in Hyderabad and to secure from them high ginning medium staple types, to replace the existing varieties in the different parts of the State. A large number of improved pure strains has been evolved under the scheme, amongst which *Gaorani* 6 is the most outstanding. The scheme was extended in July 1938, for a further period of five years from the 1st April, 1939.

The headquarters of the scheme were transferred during the year to the new Cotton Research Station at Nanded. The work in connection with the production of wilt-resistant types of *Gaorani* is, however, being continued at Parbhani, as part of the newly sanctioned scheme for the improvement of *Oomras* cotton.

During the year under review, main varietal tests were carried out with three improved *Gaorani* varieties—G. 4M-11, G. 12F-2 and G. 6—at Nanded, five types—G. 6E-3, G. 145, G. 165, G. 168 and G. 6—at Madhol, and three strains—G. 4M-11, G. 12F-2 and G. 16C—at Latur. *Jarila*, which was included in the test as a control along with the local at Nanded and Latur, was found to be distinctly poor at the latter place. G. 4M-11 was late maturing while G. 12F-2 is considered a good all-round type. The strains test at Nanded had to be abandoned due to severe damage by rain. At Madhol, G. 6E-3 and H-40-6162 showed good performance in a similar strains test; at Latur the results showed that the strains, H-40-61-07, G. 4M-11, L-H-40-405 and L-H-40-415, were worthy of further trial.

The experiment designed to study the factors affecting the yield of cotton in Hyderabad State, did not show any significant differences in yield of the standard variety, G. 6. The data obtained during the season confirmed the findings of last year that one weeding and one hoeing of cotton crop give optimum yield of seed cotton per acre.

District trials of 3 or 4 improved varieties, including *Jarila* were laid out on the cultivators' fields at 13 places in *Gaorani* area and 13 in the Telingana tract. The differences in yield between the varieties were significant at all the places except in four centres in each of the areas. The superiority of 12F-2 was observed at a number of places. The results were, however, not conclusive.

(b) Scheme for improvement of cotton of Oomras tract in Hyderabad State.—This scheme was sanctioned by the Committee in August 1940, for a period of five years, and it came into operation on the 8th October, 1941. The object of the scheme is to improve the cotton of the "*Oomras*" tract of the State. This is sought to be achieved—

(1) by the production of an early maturing and high ginning strain of *Gaorani* 12F, for the eastern half of Parbhani District and Hadgaon *taluka* of Nanded district,

(2) by the production of an early maturing and high ginning strain of Parbhani American, for the Ghat area of Aurangabad District,

(3) by evolving a wilt resistant strain from G. 16C, by crossing it with New Million Dollar, for the western half of Parbhani District and part of Bhir District,

(4) by breeding a high ginning, quick maturing, wilt and drought resistant variety capable of spinning 12-16s highest standard warp counts, for the southern half of Aurangabad District.

It is reported that the strain G. 12F-2, an early maturing sib of G. 12F, maintained its high standard of yield, spinning capacity, earliness and wilt resistance. Low ginning outturn, which is its chief drawback is being remedied by selecting plants with a high ginning capacity. In the preliminary wilt test, some 1,113 selections were tested in single rows in highly wilt infected plots; 18 progenies showed no deaths, while the mortality in 49 varied from 1-5%. Seventyeight wilt-resistant strains were tested for yield in wilt-free soil against the local varieties of Parbhani and Aurangabad and the imported variety, *Jarila*. Only nine types were significantly better in respect of yield than *Jarila*. One of these—a derivative of G. 16C II-41-6838—is reported to be very promising.

Amongst the American strains tested against *Jarila*, G. 16C and the local variety, none was as early as the controls; six strains gave significantly

better yield than Parbhani-American 1. Four strains with the desirable combination of characters are proposed to be studied in the ensuing season.

The district trials confirmed the superiority of G. 16C over *Jarila* in respect of yield of seed cotton; G12F-2 was found to significantly outyield *Jarila* at two centres. In the Ghat area, both these strains proved to be superior to Parbhani-American and *Jarila*.

The object of the Hyderabad Section of the Cotton Wilt Breeding Scheme at Poona is to evolve a cent percent wilt resistant type from the material available at Parbhani. During the season, progenies of 9 *Gaorani* strains were tested in the glass house under controlled conditions of soil and air temperatures. The results showed that none of the cultures was completely free from wilt.

(c) **Scheme for improvement of Kumpta Cotton.**—This scheme was sanctioned for a period of five years and it came into operation in November 1937. The object of the scheme is to develop certain strains of *Kumpta* cotton bred from the local variety of Raichur which, in the preliminary tests conducted at the Government Experimental Farm, Raichur, prior to the starting of the scheme, had given better yields of both seed-cotton and lint than either the local variety or improved *Jayawant*. After two years' work, the strain Raichur-*Kumpta* 15 was selected for further development. It was sown in 1939-40 on an area of about 40 acres in a cultivator's field, and an average yield of 293 lbs. of seed cotton per acre was obtained. Though this yield was a good deal better than the average of the local variety in the adjoining fields, the Committee, at its meeting held in August 1940, suggested that this strain should not be distributed on account of its susceptibility to wilt, and that strain R. K. 19 should be tested instead and attempts made at once to produce a wilt-resistant *Kumpta* type.

During the year under review, the varieties—Raichur Kumpta 15, 19 and 25— were tested against the local and Hagari in a replicated trial; the differences in yield of seed cotton were statistically insignificant. R.K. 19 and 25 were found to be fairly drought resistant but late maturing. In another experiment, four new cultures proved to be promising in respect of yield and wilt-resistance. The wilt test conducted on Hunsihalhuda showed that 65 (out of 724) single plant progenies were highly resistant to wilt. District trials conducted at 3 centres in Raichur district and 2 centres in Gulbarga district did not reveal any significant differences in yield between the five

varieties tested—R. K. 15, 19 and 25, Hagari and local. It is stated that in view of the consistently uniform spinning and agricultural performance of R. K. 19, it is proposed to multiply its seed for large scale cultivation.

The material tested at Poona under ordinary glass-house conditions of temperature and moisture consisted of eleven wilt resistant R.K. strains. The results showed that only one culture (derived from R.K. 19 x N.S. 12) recorded 60% mortality against 96-100% of the rest of the nine cultures.

BARODA.

(a) **Root Rot Scheme.**—This scheme, which has for its object the study of the root rot disease of cotton in Baroda and the production of strains resistant to it, has been in operation since February 1932. The scheme terminated on the 31st May, 1943.

During the year under report, attention was mainly concentrated on the breeding of highly resistant *karkhadi* material under uniform conditions of infection. It is reported that as in the preceding year, *karkhadi* cultures were distinctly less susceptible than Broach 9, the average mortality in the former being 38.2% against 58.9% in the latter. Differences in mortality between the various *karkhadi* families were not significant. One hundred and eightyfive cultures, comprising 160 fresh *karkhadi* selections from the district and 25 resistant survivors from the glass-house, were tested against Broach 9, in a replicated experiment; of these, 13 progenies which suffered a mortality of 35% or less were selected for further trial. In another experiment, Rozi, a perennial variety noted for its resistance to root rot, was found to be more susceptible than *karkhadi*, having recorded a mortality of 66%.

(b) **Scheme for improvement of Mathio cotton at Amreli.**—This scheme has for its object the improvement of *Mathio* mixture in respect of yield, ginning percentage and quality and the trial at Amreli of the early strains of *Wagad* evolved at Viramgam with a view to replacing, if possible, inferior *Mathio* by early *herbaceums*. The scheme came into operation in June 1937.

During the year under review, 16 families were tested against the local Mathio and C. 520 in a progeny trial; of these, 13 types were considered to be on a par with C. 520, in respect of yield. Type S-31 is said to be particularly outstanding in fibre-properties. Four selections—S. 20-2-12, S. 21-2, S. 24-2 and S. 31—are considered worthy of trial on a large scale. The results of the variety trials conducted with 8 isolates from the local Mathio confirmed

the promising behaviour of the three types—S. 21-2, S. 24-2 and S. 31. There was no significant difference between these three types or between the types and the controls as regards yield. S. 31 topped the list with a yield of 522 lbs. of seed cotton per acre, but, owing to low ginning outturn, it was inferior to C. 520 in lint yield. It was adjudged suitable for 32's highest standard warp counts compared with 12s of C. 520 and 13s of local *Mathio*. In the trial with four imported types—R. 18, C. 520 x Shan, C. 520 x *Bani*, Mollisoni x Shan—undertaken at the suggestion of the Geneticist and Botanist, Indore—R. 18 was found to be significantly superior to C. 520 as regards yield. R. 18 is, however, very poor in respect of fibre properties.

BIKANER.

Bengals Cotton Improvement Scheme.—The opening of the Gang Canal under the Sutlej Valley Scheme resulted in the colonization of a new and virgin area, known as the Gang Canal area, with immigrant peasants, mostly from the Punjab, who were accustomed to the cultivation of the Punjab *desi* and American types of cotton. These cultivators found it difficult to successfully cultivate cotton under local conditions, evidently because the new environment was not quite the same as they were accustomed to in the Punjab. This scheme was, therefore, started in January 1931, for the purpose of studying the local problems of the agriculturist and for obtaining by selection and hybridization one or more superior types of cotton suitable to the locality. The poor stand of the cotton crop under the Ganganagar conditions was reported to be due to (1) poor germination of seed and (2) mortality of the plants at all stages of growth due, chiefly, to whiteant attack. Until 1934, the botanical work was confined to the testing out of a large number of outside varieties, both *desi* and American. After that year, however, extensive survey of the Rajputana tract was undertaken to collect breeding material, at the same time, extensive trials of the few selected cottons from outside were continued to test their suitability to the tract. Agronomic work was pursued intensively from the beginning of the scheme. At the end of the first five years, it was found that C. 520 was the most profitable cotton to grow in the tract and that the American cottons were generally unsuitable because of their low yield and susceptibility to disease. Also the staple of Punjab-American cottons was found to deteriorate both in length and strength when grown under Ganganagar conditions. A large amount of data and useful information regarding sowing times, seed rate, frequency and distribution of

irrigation, optimum spacing for the *desi* and American cottons, rotation and manuring have been collected. Since 1934, greater attention has been paid to selection and breeding problems.

During the year under review, the new strain R. 18 is reported to have once again out-yielded C. 520, the strain so far recommended for the Colony. In the demonstration plots at Padampur where the soil is said to be particularly good for cotton, R. 18 gave over 15 maunds of seed cotton per acre. In respect of ginning outturn, it was found unequalled by any other strain tried in Ganganagar. Three cultures, B-1, SBH and B-17, whose yields were on a par with that of R. 18 in the varietal test, have been retained for further trial. Amongst the Punjab-American varieties, *viz.*, 289F/43, L.S.S., L.S.S. early and 124F, tested in another experiment, there were no significant differences in yield of seed cotton; the trial is proposed to be repeated next year to see if any other American strain can replace 289F/43 (which had previously been found to be the best suited American cotton for the Colony and the seed of which was being distributed to the cultivators) owing to its low ginning.

Fifty-eight progenies from the various crosses were tested with R. 18 and C. 520 as checks; of these ten families with a ginning outturn comparable to that of C. 520 and with a halo length 10-12% longer than either R. 18 or C. 520, were selected for trial in the coming season. Experiments were undertaken to test the efficacy of the various pre-treatments of seed, such as, soaking in water for different periods, delinting and coating the seed with dung. Very satisfactory germination is stated to have been obtained in the case of delinted seed soaked in water for 6 hours.

MYSORE.

Mysore (Doddahathi) Cotton Scheme.—This scheme, which was sanctioned in 1935, is concerned with the breeding, from the local *Doddahathi* or American cotton, of suitable types, resistant to "red leaf" disease which stands in the way of the expansion of this crop in the Irwin Canal area in Mysore State.

It is reported that in the seasonal-varietal trials conducted during the year at the Irwin Canal farm with the improved Mysore-American strains and Co. 4, the highest yields were recorded for the May sown crop. Of the seven varieties tested, M.A. VI, VII and VIII proved to be inferior to M.A. II, M.A.V., Co. 4 and M.A. IX, in respect of yield; the differences in yield between the latter four strains were not statistically significant. At the Babbur farm, May planting was again found to give the highest yields, 952 lbs.

and 983 lbs. per acre being obtained from Co. 4 and M.A. V, respectively. Under rainfed conditions, at the Hebbal farm, M.A. II was found to be superior in respect of yield to M.A. IV, V, Co. 4 and Co. 3.

Work on crosses was confined to Co. 2 x Kampala, 289F/38 x Uganda and two *purpurascens* crosses with M.A. II and Co. 2. Homozygous strains from the former two crosses are being multiplied for testing in the ensuing season.

In the trials of Egyptian and Sea Island varieties, Giza 12 gave 600 lbs. and 770 lbs. per acre on the Irwin Canal and Babbur farms, respectively, while in the Agricultural Colonies, Ashmouni proved to be the best with an acre yield of 450 lbs. Of the two strains of Sea Island under observation, V. 135 was better in all respects than Montserrat Sea Island.

Seed of three new strains, *viz.*, M.A. V, VI and IX, has been distributed to cover an area of about 100 acres, with the object of collecting sufficient material for testing the strains later in the Irwin Canal tract and in the rainfed tracts of Hassan and Chitaldurg districts. It is proposed to substitute M.A. IX, a superior quality strain, for M.A. II, the present standard variety of the dry tract.

CHAPTER VI.

SEED DISTRIBUTION AND EXTENSION SCHEMES.

From the point of view of the grower, special significance attaches to the Seed Distribution and Extension Schemes of the Committee, as they form the real link between the Experiment Station and the cultivator. The total amount so far spent by the Committee on such schemes amounts to some Rs. 15 lakhs. During the period under review, there were seventeen seed distribution and extension schemes in operation in the various cotton growing provinces and States ; a brief report on the working of these schemes is given below :—

BOMBAY.

(a) **Surat seed Distribution Scheme.**—This scheme was first sanctioned in November 1929 for a period of two years. In December 1931, it was extended for another two years, pending the final decision of the Committee on the cotton policy to be adopted in the Surat area. In January 1934, after a thorough examination of the relative merits of 1*A* and 1027 *A.L.F.*, the Committee decided in favour of the latter and extended the scheme for five years for the distribution of 1027 *A.L.F.* seed in the Surat area. In November 1938, the scheme was extended for a further period of one year, in August 1939, for three years, and again in July 1942, for a period of two years from the 1st April, 1943.

During the year under report, the Agricultural Department controlled a seed multiplication area of 30,731 acres (including 757 acres grown with farm pedigree seed), against 31,543 acres (including 1,300 acres grown with farm pedigree seed) last year. An area of 1,272 acres under *Suyog* (Segregate 8-1) was also controlled. It is reported that compared with the previous year, there was no improvement in the position regarding the demand for 1027 *A.L.F.* in Surat district, as many of the co-operative societies and the Bardoli group villages reverted to the policy of growing Selection 1*A* or a mixture of Selection 1*A* and 1027 *A.L.F.* The amended Cotton Transport Act also did not help much in the expansion of 1027 *A.L.F.* in Surat district. The Agricultural Department handled 16,37,476 lbs. of seed, of which 11,86,636 lbs. were distributed in British areas, and 4,50,840 lbs. supplied to States, the corresponding figure for the previous year being 2,534,690 lbs. of which

10,38,837 lbs. were distributed in British areas and 14,38,497 lbs. in the States. Field inspection of the cotton area in Surat which was continued during the year under review showed that the controlled area under 1027 *A.L.F.* was purer to a greater extent than in the previous year.

Guaranteed pure cotton of 1027 *A.L.F.* and *Suyog* was sold under two Agmarked labels—red for pedigree cotton and black for certified cotton, and 111 bales of Agmark (red label) and 2,588 bales of Agmark (black label) 1027 *A.L.F.*, 10 bales of Agmark (red label) and 304 bales of Agmark (black label) *Suyog* cotton were pressed and disposed of at premiums varying from Rs. 11 to Rs. 22. The premium obtained last year from 1027 *A.L.F.* ranged between Rs. 15 and Rs. 27.

The following table shows the comparative figures for yield, ginning percentage and price of 1027 *A.L.F.* and Selection 1A :—

Name of variety.	Yield of seed cotton per acre in lbs.	Ginning percentage.	Yield of lint per acre in lbs.	Price per *candy of* lint. (800 lbs.) Rs.	Price of lint yield per acre. Rs.
1027 *A. L. F.*	260	33.3	86.5	820	88/6
Selection 1A.	300	37.0	111	800	111/0

From the above table it will be seen that the cultivator of 1027 *A.L.F.* gets Rs. 22-10-0 less per acre than the grower of Selection 1A.

(b) Scheme for Selection 1A Cotton.—This scheme was sanctioned in November 1938, for a period of three years, subject to the condition that it should come into operation only if and after the Government of Bombay had isolated Olpad and part of Chorasi Taluka, and that it should continue only so long as this area was effectively isolated. On the fulfilment of this condition, the scheme came into operation in February 1940. In July 1942, it was extended for a further period of two years and two months. The objects of the scheme are (1) to confine the growth of 1A, as far as possible, to Olpad Taluka, by restricting the movement of cotton and cotton seed out of that area and by making provision for pure seed of Selection 1A for cultivation within the Taluka area, and (2) to check the cultivation of 1A in the rest of the Surat area by arranging for the distribution of adequate quantities of pure seed of 1027 *A.L.F.* and by intensive propaganda against Selection 1A.

During the year under report, due to the lateness of the season, only four check stations (including one permanent) against, ten in the previous year, were established on the Tapti river from the 1st March, 1943. Ginned cotton was allowed to be transported, under licence, to Surat for being pressed and marked ' Olpad' before sale; this work was supervised by the Agricultural Overseer. 7,801 half-pressed bales were pressed into 12,094 full pressed bales by the end of May 1943 after import under licences into the Surat protected area.

The survey of Selection 1A in the Surat and South Surat areas was discontinued during the year.

An analysis of the prices obtained for 1027, Selection 1A and Local mixed Surti revealed that during the season, pure 1027 realised Rs. 12 premium over local and Rs. 15 over Selection 1A marked ' Olpad ' against Rs. 10 to Rs. 18 over Local and Rs. 12 to Rs. 24 over Selection 1A marked ' Olpad ' last year. The position of 1027 *A.L.F.* is in no way better than in the previous years.

(c) **Jarila Seed Distribution and Extension Scheme.**—This scheme was sanctioned in March 1937, for a period of ten months in the first instance. It was extended in January 1938, for a period of one year, in November 1938, for three years and again in July 1941, for a further period of five years. Its original object was to replace *Banilla* in the Khandesh tract with *Jarila*, which is wilt resistant, over an area of some 1,55,000 acres. In view, however, of the general suitability of *Jarila* for the Khandesh area, the expansion now aimed at is 8,00,000 acres, out of a total cotton area of 11,00 000.

The scheme is operated in five stages of which the first two are the Government Farms at Jalgaon and Bhadgaon. The seed produced at the Jalgaon Farm is used for further multiplication in the wilt affected regions, and that at Bhadgaon Farm for the wilt free zone of Khandesh. In January 1943, the Committee approved of the proposal to close down the seed farm at Bhadgaon and to transfer the seed multiplication work being done there to the Jalgaon Farm and the Mamurabad village adjoining it.

Stages I and II.—Out of 350 lbs. of selfed seed produced in the previous year, about 250 lbs. were used for sowing on 15 acres of the Farm area and 2 acres of tenant lands; the remaining 100 lbs. will be used for sowing in 1943-44. It is reported that due to poor yield the quantity of pure seed obtained from the above 17 acres was only 1,976 lbs. The quantity of seed produced

from the 123 acres of the tenants' area was 13,280 lbs. which were handed over to the Cotton Superintendent, Jalgaon, for further multiplication. All the cotton was ginned in the Farm gin and sold at a premium of Rs. 22-2-0 per *candy* over Bombay quotation for *Jarila*.

Stages III, IV and V.—During the year under report, 53,21,550 lbs. of *Jarila* seed were distributed by the Department and approved stockists over a controlled area of 2,99,306 acres (including a reserved area of 94,717 acres). This falls short of the stipulated area of 3,15,000 acres by 15,694 acres, and is attributed to (*i*) the 'Grow More Food' campaign, (*ii*) the higher seed rate in some cases and (*iii*) stock of seed remaining unsold particularly in Nasik district. The area under natural spread is estimated at 4,72,033 acres, bringing the total area to 7,71,339 acres against 5,99,000 acres last year.

During the year under report, 3103 *bojas* of lint were sold at an average premium of Rs. 18 over Bombay *Jarila* quotation. On an average, *Jarila* is stated to have fetched Rs. 4-10-0 more per maund than Local. The gross extra income realised by cultivators by growing *Jarila* is estimated at Rs. 1,06,54,119.

For sowing in 1943-44, the Agricultural Department has stocked 12,54,370 lbs. of seed, sufficient for 67,543 acres. The approved stockists have stocked 61,75,000 lbs. to cover an area of 3,32,500 acres. In addition to the above, it is reported that 9,10,000 lbs. of seed, sufficient for 49,000 acres, have been retained by growers and merchants.

With a view to prevent the admixture of *Jarila*, and other cottons of inferior type in ginning and pressing factories, the Government of Bombay issued a notification making the mixing of cotton a penal offence. The Provincial Government have informed the public of their intention to apply the Cotton Control Act to East Khandesh district with a view to encouraging the spread of pure *Jarila*.

(d) Deccan Canals (Jarila) Seed Distribution Scheme.—This scheme was sanctioned in January 1934, for a period of five years and came into operation in April 1934. In August 1939, a further extension for five years was sanctioned. At the same time the venue of seed multiplication was also changed from Kopergaon and organised on new lines in Baramati tract.

The original object of the scheme was to distribute seed of *Banilla* to enhance general cotton yields and to improve the quality of the cotton in the Deccan Canals tract in the Poona, Sholapur and Ahmednagar districts. In

view, however, of the susceptibility of *Banilla* to the wilt disease, the Committee, at its meeting held in January 1942, approved of the proposal to replace *Banilla* by *Jarila*, which gives a bigger return per acre and is, at the same time, capable of resisting wilt to a great extent.

During the year under report, the scheme was kept in abeyance as irrigation under Deccan Canals was being regulated with a view to encourage the cultivation of food crops and to discourage the growing of cotton.

(e) **B. D. 8 Seed Distribution Scheme.**—This scheme is concerned with (1) the marketing of pure B.D.8 cotton in order to secure a price commensurate with its quality, (2) the multiplication of pure seed for further extension and (3) propaganda work for increasing the production of pure B.D.8. It was sanctioned in August 1935, for a period of three years and came into operation in December 1935; in July 1938, it was extended for a period of five years.

During the year, owing to the high premium received for B.D.8 last year and the adoption of the new Indian Cotton Contract (which discouraged the cultivation of short staple cottons), the area under this variety in the Broach district (excluding Ankleshwar taluka) rose to 27,339 acres from 13,178 acres in the previous year. The Agricultural Department controlled, 5,747 acres for seed multiplication, including 367 acres grown with pedigree seed from the Broach Farm and from registered seed farms. 4,55,839 lbs. of seed, including 1,93,680 lbs. of seed supplied outside Broach district, were distributed during the year.

B.D.8 cotton was ginned under departmental supervision and 1,871 bales of pure cotton from the controlled area were pressed, out of which 1,669 bales were sold at a premium varying from Rs. 122 to Rs. 204 per candy. The seed cotton from the general area also fetched a premium varying from Rs. 25 to Rs. 75 per bhar (1,020 lbs.) over local.

Trials of Segregates 1-2 and 1-6 were made during the year. Their performance in comparison with B.D.8 is as under :—

Name of variety.	*Ginning percentage.*	*Staple length. mm.*
Seg. 1—2	38·4	21·6
Seg. 1—6	38·5	21·5
B. D.8	30·2	21·9

During the year, 6,418 acres were under Segregates 1—2 and 1—6, and 3,076 bales were produced, out of which 1,202 bales were disposed of at a premium of Rs. 122 to Rs. 170 per *candy*.

(f) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme.— This scheme, which was sanctioned in August 1935, for a period of five years, replaced five seed schemes in the Southern Division of the Bombay Province, *viz.*, the Hubli, Gadag, Athani, Haveri and Bailhongal schemes. It came into operation on the 1st June, 1936; in August 1940, it was extended for a period of one year and again in July 1941, for a further period of four years from 1st June, 1942. The object of the scheme is to eliminate local mixtures and to extend pure *Jayawant* and *Gadag No.* 1 cottons in the Southern Division of the Bombay Province, over an area of 9½ lakhs of acres, within a period of five years.

During the year under report, the Department organised an area of 1,38,921 acres of *Jayawant* and 25,895 acres of *Gadag No.* 1, of which 81,262 acres and 22,588 acres, respectively, were rogued, 42,931 bags of *Jayawant* and 15,539 bags of *Gadag No.* 1 seed, to cover an area of 6,01,034 acres and 1,55,390 acres, respectively, were distributed. In addition, the area under natural spread is estimated at 1,75,000 and 50,000 acres, under *Jayawant* and *Gadag No.* 1, respectively. Thus the total area under *Jayawant* was 7,76,034 acres while that under *Gadag No.* 1 was 2,05,390 acres.

The produce of improved cotton was pooled and 27,156 *docras* of *Jayawant* and 10,858 *docras* of Gadag No. 1 were sold by auction at a premium of Rs. 10 per *naga* for *Jayawant* and Rs. 15 per *naga* for Gadag No. 1, over the *bazaar* rate.

For sowing in the next season, 64,065 bags of *Jayawant* and 18,720 bags of Gadag No. 1 are proposed to be stocked, of which 47,832 and 13,695 bags, respectively, were purchased up to 1st May, 1943.

Propaganda was undertaken in connection with the Agmarking of improved cottons. 6,000 bales of *Jayawant* and 75 bales of Gadag No. 1 were pressed under Agmark. It is reported, however, that Agmarked bales did not fetch adequate price due to the indifference of mills for pure cotton.

(g) Scheme for Cultivation of 1027 A. L. F. Cotton in Nawapur Taluka.— This scheme was sanctioned by the Committee in January 1942, for a period of three years. It came into operation on the 4th May, 1942. The object of the scheme is to bring an area of 25,000 acres in Nawapur taluka under 1027 A. L. F. cotton.

During the year under report, 24,854 lbs. of seed of 1027 A. L. F., obtained from Surat, were distributed over an area of 1,228 acres (including a certified area of 1,113 acres). The produce was pooled and marketed by public auction at Rs. 300 and more per *bhar* of *kapas* against Rs. 250 to Rs. 275 received by the cultivators in the past. It is reported that 1027 A. L. F. gave a return of Rs. 60 per acre against Rs. 53/9 by the local.

SIND.

(a) **Seed Distribution and Extension Scheme.**—This scheme was sanctioned in December 1930, for a period of three years and came into operation in April 1931. It was extended in August 1933, for five years from the 1st April, 1934, and in November 1938, a further extension for two years was sanctioned. In August 1940, it was extended for a further period of five years from the 1st April, 1941.

The main objects of the scheme are :—

(*a*) Varietal tests of improved strains—Sind American cottons.

(*b*) Trials of high quality cottons—Egyptian and imported American cottons.

(*c*) Demonstration of cotton cultivation on non-cotton growing areas of new barrage lands.

(*d*) Seed multiplication, distribution and extension work.

(*e*) Propaganda, demonstration and advisory work in connection with the extension of improved varieties of cotton and better methods of cultivation.

(*f*) Assistance to cotton growers in marketing cotton.

The work on the Right Bank mainly consists of the extension of cotton cultivation, while on the Left Bank, attention is largely devoted to seed multiplication and distribution of improved varieties of cotton and the introduction of better methods of cultivation.

The total area under cotton in Sind (British Districts) during the year was 7,25,500 acres against 9,38,365 acres in the previous year—a decrease of 22%, which is stated to be due to lawlessness, martial law and the " Grow More Food " campaign. The area under improved strains comprised 65% of the total cotton area against 51.5% in 1941.

The introduction of M.4 (an improved American type) is stated to have solved the problem of replacing *desi* with American cotton in Nawabshah district. This variety is said to yield well and to be in great demand.

The estimated area and yield per acre of the principal improved strains and the relative acre cash values are reported to be as follows :—

Name of improved variety.	Estimated area.	Estimated yield per acre.	Relative acre cash value.
	Acres.	Maunds.	Rs.
Sind Sudhar	4,30,000	9	128-0-0
M. 4	17,000	9	128-0-0
Sind N. R.	39,000	9	76-8-0
Sind 98	28,000	5	70-0-0

The extra gross income to the growers of improved varieties is estimated at Rs. 42,03,500.

For sowing in 1943-44, 64,300 maunds of Sind *Sudhar* 29,000 maunds of M. 4 (excluding 30,000 maunds sold by factories) and 4,200 maunds of Sind N.R. were distributed by the Department.

(b) **Financing of Seed Distribution.**—This scheme was sanctioned by the Committee in January 1938, for a period of three years, subject to the condition that it would not be put into operation until the Rules under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, have been brought into force. This condition was fulfilled on 18th April, 1941, and the scheme came into operation in January 1942.

The object of the scheme is (1) to establish a compact block of improved varieties of long staple cotton in Sind, (2) to make large quantities of pure seed available to the cultivators and (3) to provide an organization for effective distribution of seed even to the remotest corners of the cotton zones.

During the year under report, out of about 3,00,000 acres grown under departmental seed, the areas rogued were as follws :—

Sind Sudhar.	Sind-98.	M. 4.	Sind N-R.	Total.
Acres. 64,300	Acres. 4,350	Acres. 3,270	Acres. 900	Acres. 72,820

64,800 maunds of Sind *Sudhar*, 29,000 maunds of M.4, 4,200 maunds of Sind N.R. and 6,500 maunds of 4F-98—in all 1,04,500 maunds of seed—were purchased for distribution.

Ginning and pressing were supervised by the Department and certificates of purity of full pressed bales were issued to ginners. It is reported that certified full pressed bales fetched a premium of about Rs. 4 per maund of cotton. The growers got from the ginners about 8 annas per maund extra premium for certified *kapas*.

The following table shows the standards of purity, soundness, germination and weight (100 seeds) of the cotton seed during 1942-43 :—

	Sind *Sudhar*.	M.4.	Sind N.R.	4F-98.
Purity	97%	95%*	99.5%	Not known.
Soundness	77.5%	68%	85%	
Germination	66%	60%	80%	
Weight of 100 seeds ..	7.4 gms.	7.4 gms.	5.8 gms.	

It is stated that difficulty was experienced in disposing of the Sind *Sudhar* cotton seed purchased by the Department, as the cultivators preferred M.4 variety.

CENTRAL PROVINCES AND BERAR.

(a) **Verum Seed Distribution and Marketing Scheme.**—In November 1929, the Committee sanctioned, for a period of one year in the first instance, the Central Provinces Verum Seed Distribution and Extension Scheme. It started work in September 1930, and was extended annually up to the end of July 1934, when it was combined with the newly sanctioned scheme for the extension of long staple cottons in the Central Provinces. The combined scheme, known as " Scheme for Extension of Long Staple Cotton and Marketing of Verum cotton in the Central Provinces and Berar " was sanctioned for five years from June 1934. At the meeting of the Committee, held in July 1938, it was extended up to the 31st May, 1941, the title being changed to " Scheme for the Extension and Marketing of V. 434 cotton." In January 1941, a further extension up to 29th February, 1944, was sanctioned. The

* Attended after hand-picking of off-type seeds.

scheme aims at the expansion of area under V. 434 cotton in the seven *taluqs* where Verum has made most headway in the past, the ultimate object being to eliminate all other varieties as far as possible. During the extension period, the objective will be to raise the area in six of the seven *taluqs* (excluding Ellichpur) to 5 lakhs of acres.

During the year under report, the Agricultural Department distributed 38,278 maunds of seed through the agency of Government seed stores, *taluq* agricultural associations and seed farmers. An area of 256,295 acres (165,193 acres under departmental spread and 91,100 acres under natural spread) was covered against 291,103 acres last year. The decrease in area is attributed to the rapid spread of *Jarila* and *Buri* 107. It is reported that in addition to the above, 22,346 maunds of seed were distributed outside the selected *taluqs*. The total amount of seed distributed in the Central Provinces and Berar was thus 60,624 maunds. 47,366 maunds of pure seed have been stocked for distribution in the next season.

The total number of bales sold through the departmental pool amounted to 7,169 bales, of which 5,514 were of V. 434, the special areas contributing 3,507 bales. The average premium obtained was Rs. 37-8-0. The total extra income derived by the growers of V. 434 in the year under report is estimated at about Rs. 47 lakhs.

The area under Verum 434 fell short both in Berar and Nimar on account of the rapid expansion of *Jarila* in the former and *Jarila* and Buri 107 in the latter. In 4 *taluqs* of Berar particularly Mehkar and Chikhli which adjoin Khandesh the area fell from 2,08,168 acres in 1941-42 to 1,86,055 acres in 1942-43 showing a fall of 10·6% on the previous year's figures. It stood at 40·95% of the area aimed at *viz.*, 3·50 lakhs acres. In Khandwa and Harsud *tahsils* of Nimar district the area had increased from 53,383 acres in 1941-42 to 70,248 acres in 1942-43 as against the area of 1·50 lakhs acres aimed at. *Jarila* had gained a footing in the province in the previous year, particularly in areas bordering Khandesh and it also spread to the selected blocks. The previous year's field performance of *Jarila* and the good premium that *Jarila kapas* fetched, and also the efforts the Government made to eliminate *Oomra*, and replace it by medium staple cotton resulted in increasing the *Jarila* area to 1,368,048 acres of which 3,22,000 acres were in the Verum selected blocks. *Jarila* has a higher ginning percentage on account of which it fetched a premium on Verum 434 *kapas* in the local markets. The premium in Berar had been

particularly high amounting to Rs. 10 per *khandi* of *kapas*, which made it a strong competitor there with Verum. In Nimar the premium was not equally high but there was strong competition from Buri 107 cotton which increased in selected blocks there to 35,000 acres during the last three years. During the year the cotton outturns were poor in general and *Jarila* did not fare nearly so satisfactorily as in the previous year; however, the premium on *Jarila kapas* obtained was sufficient inducement for cultivators to continue to grow it. The performance of these two varieties is being closely watched.

(b) **Scheme for Distribution and Marketing of Buri 107 cotton.**—This scheme was sanctioned by the Committee in July 1938, for a period of three years, and came into operation on the 1st March, 1939. In January 1941, it was extended up to the 29th February, 1944. The object of the scheme is to introduce Buri 107—a selection from acclimatised *Gossypium hirsutum* developed under the Central Provinces Botanical Research Scheme—in Burhanpur *Tahsil* of Nimar district, where the total area under cotton is about 75,000 acres. Commencing with an area of 2,000 acres in 1938-39, the programme was to raise the area under this cotton to 10,000 acres in 1939-40 and 30,000 acres in 1940-41. During the extension period, the aim will be to raise the area to 50,000 acres and to maintain it at that figure.

During the year under report, 3,296 *maunds* of seed were distributed by the Department over an area of 26,409 acres; in addition 4,600 *maunds* of seed, obtained from *kapas* ginned under departmental supervision, were sown over an area of about 23,000 acres. In all, 49,409 acres were covered under Buri 107, thus practically achieving the object of raising an area of 50,000 acres under this variety.

The significant achievement of this scheme is that local Buri is now practically non-existent. The gross extra income derived by the growers of Buri 107 is estimated at Rs. 4·41 lakhs. With a view to securing sufficient pure seed for sowing in the next year, a total area of 22,587 acres was under supervision, of which, 6455 acres were rogued. 3,133 *maunds* of seed have been purchased by the Department, 415 *maunds* stocked by Tahsil Agricultural Association and 6,000 *maunds* collected by *dalals* from rogued areas. In all about 9,550 *maunds* of certifiable Buri 107, sufficient for 50,000 acres, will be available for sowing in the next season.

MADRAS.

(a) Co. 3 Seed Distribution Scheme.—This scheme, which replaced the Madras Co.2 seed distribution scheme, was sanctioned in January 1942, for a period of four years and five months. It came into operation in July 1942. Its object is to improve the present standard of Cambodia cotton in Salem district by replacing the existing Co.1 and Co.2 cotton strains with Co. 3.

During the year under report, the Marketing Society at Tiruchengode, which has been entrusted with the running of the seed farms, under the control of the Agricultural Department, purchased 31,886 lbs. of seed from the Agricultural Department and distributed 31,079 lbs. to 343 members of 17 village co-operative societies, and also to the Tiruchengode Marketing Society; the remaining 807 lbs. were mostly utilized for gap-filling. Owing, however, to unfavourable seasonal conditions, the area sown under seed farm conditions was only 1,250 acres, against 1,500 acres arranged for; it is stated that the seed obtained will be sufficient to cover an area of 8,500 acres. The Society has stocked 170,262 lbs. of seed for distribution during 1943-44. It is proposed to increase the seed farm area in the ensuing year to 5,300 acres (4,500 acres at Tiruchengode, Salem and Rasipuram and an additional area of 800 acres) so as to produce sufficient seed for an area of 40,000 acres in 1944-45.

Premia ranging from Rs. 15 to Rs. 27/8 per *pothi* (305 lbs.) of *kapas* over the local were obtained by the seed farm growers; a profit of Rs. 13,260 was realised from the sale of 633 *pothies* of *kapas*. In addition, the cultivators are reported to have benefited to the extent of Rs. 25 per acre from the higher yield of Co.3. The total gain to the growers of Co.3 during the year under report is estimated at Rs. 55,310, which works out to Rs. 44 per acre.

(b) Scheme for Distribution of H. 1 Strain in the Westerns Area.—The Scheme, which was sanctioned by the Committee in July 1941, started work in July 1942, in three selected centres, *viz.*, Bellary, Adoni and Guntakal. The object of the new scheme is to organise the multiplication and distribution of H.1 cotton seed over 2,00,000 acres in the 4th year, in the three areas of Adoni, Guntakal and Bellary of the Westerns tract of the Madras Province.

The Agricultural Department has been maintaining an area of 3,000 acres for the multiplication of H.1 seed and the seed obtained from it is distributed annually to cover an area of 30,000 acres. For purposes of large

scale production and distribution of pure seed, the tract is divided into three convenient areas with centres at Adoni, Guntakal and Bellary. Under Departmental supervision the seed-farms in the areas in question are sown, rogued, the produce collected and ginned, and the lint sold through the Co-operative Societies. The cleaned seed obtained from the produce is handed over to the societies for sale. During the year under review, seed farms covering over 5,111 acres were arranged for against 7,500 acres originally programmed, the reduction being solely in the Bellary area where owing to adverse seasonal conditions sowings had to be restricted. The crop is stated to have suffered from drought in the Adoni and Guntakal areas, the yield being only a third of the normal. 1,86,600 lbs. of seed have been obtained from the seed farms so far and a further quantity of about 26,400 lbs. is expected; the total seed from the farms is considered to be sufficient to cover only 15,000 acres in 1943-44. At Adoni the lint of H. 1. variety was sold at a premium of Rs. 6 per 312 lbs. In the ensuing season, it is proposed to arrange seed farms of 5,000 acres in each of the three divisions, Adoni, Guntakal and Bellary.

(c) **Maintenance of Nucleus of pure seed of Improved Varieties of cotton, Co. 2 and K. 1.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years and came into operation in September 1938.

The area selfed and the quantity of selfed seed produced of each variety during the year are given below :—

Name of variety.	Area selfed Acres.	Quantity of selfed seed produced. lbs.	How disposed of.
Co.2	1	131	Utilised for sowing the inner seed farm area at Tirupur.
K.1	2	327	Utilised for multiplication plot sowings of A. R. S., Koilpatti.

The low production was due to adverse seasonal conditions.

UNITED PROVINCES.

Scheme for Distribution and Extension and Marketing of Perso-American Cotton in Western United Provinces.—This scheme was sanctioned in January 1942 for a period of four years. The agricultural and marketing part of the scheme came into operation on the 6th May, 1942, and the co-operative organisation is expected to start in 1943-44.

The objects of the scheme are (*i*) to multiply pure seed of Perso-American cotton for large-scale distribution and to extend its cultivation over suitable areas in the districts of Aligarh, Bulandshahr and parts of Meerut, Muttra and Etah and (*ii*) to organize the marketing and grading of Perso-American produce through co-operative sale societies and other agencies.

During the year under report, despite unfavourable seasonal conditions, the yield of Perso-American is reported to compare favourably with the varieties intended to be displaced. The average yield of Perso-American is estimated at 4 maunds against 3¼ maunds and 2½ maunds for C. 520 and *desi*, respectively. 5,264 maunds of *kapas* obtained from stage III and IV were purchased by the Department at a premium of Re. 1 per maund over the market rate. It is stated that the cultivator got Rs. 4 to Rs. 6 per maund of *kapas* over *desi*. The quantity of 2,974 maunds of seed secured in the fourth stage would suffice for an area of 11,886 acres next year.

340 bales produced from the *kapas* purchased by the Department were sold at a premium of Rs. 20 over *Jarila*. Perso-American lint fetched a price of Rs. 25 to Rs. 35 per maund more than *desi*. The gross extra income to the growers is estimated at Rs. 38,819 from an area of 1,320 acres.

BARODA STATE.

(a) Baroda (Navsari) Seed Storage Scheme.—This scheme is concerned with the spread of 1027 A.L.F. in the Navsari district of the Baroda State. It was sanctioned in February 1933, for a period of five years, subject to the condition that the Baroda Government would arrange a seed multiplication area of 1,000 to 2,000 acres in that district. At the meeting of the Committee in July 1938, the scheme was extended for a period of five years and again in July 1943, for a further period of one year from the 16th April, 1944.

During the year under report, the total area under 1027 A.L.F. was estimated at 2,10,000 acres of which the controlled area was 31,655 acres, the corresponding figures for the last year being 2,52,863 and 46,955 acres, res-

pectively. The reason for the reduction in area might be due to the vagaries of the monsoon. The total quantity of seed distributed was 26,56,500 lbs. against 37,47,942 lbs. in the previous year.

Owing to the unexpected behaviour of the cotton market, it is reported that individual growers preferred to sell their cotton direct, making it increasingly difficult to pool cotton for ginning under departmental supervision. The certified cotton from checked fields was pooled, ginned and baled under departmental supervision, and given 'Agmark' labels. The bales produced by societies from areas which were not of the requisite standard for seed supply were given "green label." The bales produced by societies from other areas of the state which fetched a premium of at least Rs. 5 over local, were given a stencil stamp of "1027 A.L.F. Baroda State Produce." Up to the 31st March, 1943, 1,417 bales (Agmark 828, Green label 130 and stencil stamped 459) were ginned. The gross extra income received by the cultivators of 1027 A.L.F. was estimated at Rs. 3,15,000 at the rate of Rs. 1-8-0 per acre for an area of 2,10,000 acres.

To meet the demand for seed in the ensuing year, 28,87,500 lbs. of seed will be purchased and stored.

(b) **Baroda B. D. 8 Seed Distribution Scheme.**—This scheme, which has for its object the extension of B.D. 8 cotton in Baroda district, was sanctioned in July 1938, for a period of five years and came into operation on the 1st April, 1939. Its object is to popularise B.D. 8 cotton (which is wilt-resistant and superior in quality to the local cottons) over 60,000 acres of the *Kahnam* black soil area of the Baroda district, north of the river Nerbudda.

During the year under report, 4,22,240 lbs. of B.D. 8 seed (consisting of 15,320 lbs. A grade, 1,03,560 lbs. B grade, and 3,03,360 lbs. C grade) were stocked, of which 3,01,213 lbs. of seed was issued for sowing over 28,515 acres (1,015 acres of A grade, 9,500 acres of B grade, and 18,000 acres of C grade). Owing, however, to the vagaries of the monsoon, only 23,710 acres were under controlled area. As a result of field checking for purity standards, the controlled area was further reduced to 22,865 acres (A 1,010 acres, B 8,090 acres and C 13,765 acres). About 5,000 acres were under natural spread. Out of an expected crop of 5,500 *bhars*, nearly 3,500 *bhars* were pooled at an average premium of Rs. 65 over local, an additional income of Rs. 2,27,500 being realised by growers. In addition, the non-certified growers were reported to have received Rs. 80,000 extra.

For sowing in 1943-44, 6,400 lbs. of A grade seed, sufficient for 500 acres, 1,20,320 lbs. of B grade seed, sufficient for 11,000 acres, and 5,32,480 lbs. of C grade seed sufficient for 50,000 acres, have been stocked.

In the interests of the cultivators, the Baroda Government have decided to apply from the 1943 season, the provisions of the Cotton Control Act, making the sowing of B.D. 8 compulsory in specified areas.

(c) **B. 9 Seed Storage Scheme.**—This scheme was sanctioned in July 1941 for a period of five years. It came into operation on the 1st September, 1942. The object of the scheme is to introduce in the areas of Baroda district, not suited to B.D. 8, a cotton superior both in staple and spinning value to the average Broach grown locally.

During the year under report, the Department issued 2,27,500 lbs. of seed (7,900 lbs. of A grade, 80,800 lbs. of B grade and 1,38,720 lbs. of C grade), for sowing over 23,950 acres (775 acres of A grade, 9,000 acres of B grade and 14,175 acres of C grade). Owing to the vagaries of the weather, however, only 670 acres of A grade and 6,314 acres of B grade were of certifiable purity standards. Against an expected crop of 1,000 *bhars* of seed cotton, only 484 *bhars* (89 of A grade and 395 of B grade) were pooled up to 31st March, 1943. For nearly 780 *bhars* that were pooled, an average of Rs. 50 per *bhar* was received as ' ON,' thus giving an additional income of Rs. 39,000 to certified growers. In addition, it is estimated that non-certified growers received an average of Rs. 40 per *bhar* more and made Rs. 1,20,000 extra thereby.

21,780 lbs. of A grade seed sufficient for 2,000 acres, 1,99,680 lbs. of B grade seed sufficient for 16,000 acres and 2,52,800 lbs. of C grade seed sufficient for 25,280 acres have been stocked for sowing in 1943-44. Owing to its ginning and staple qualities, B 9 is reported to have maintained the same level of prices as 1027 and B.D. 8. The Baroda Government have decided to enforce under the Cotton Control Act, the growing of B 9 only in Savli and Waghodia talukas.

D. N. MAHTA.
Secretary.

APPENDIX I.

MEMBERS OF THE INDIAN CENTRAL COTTON COMMITTEE.

(1) PRESIDENT—

Sir Pheroze M. Kharegat, C.I.E., I.C.S., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*.

(*a*) Mr. H. R. Stewart, C.I.E., Agricultural Commissioner with the Government of India, *ex-officio*.

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS—

Madras	Mr. P. H. Rama Reddi, I.A.S., Director of Agriculture.
Bombay	Mr. W. J. Jenkins, C.I.E., I.A.S., Director of Agriculture.
United Provinces	Mr. C. Maya Das, I.A.S., Director of Agriculture.
Punjab	Malik Sultan Ali Noon I.A.S., Director of Agriculture.
Central Provinces and Berar	Mr. J. C. McDougall, C.I.E., I.A.S., Director of Agriculture.
Sind	Mr. V. Isvaran I.C.S., Director of Agriculture.

(3) THE DEPUTY ECONOMIC ADVISER TO THE GOVERNMENT OF INDIA, *ex-officio*.

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS—

The East India Cotton Association ..	Sir Purshotamdas Thakurdas, C.I.E., M.B.E.
The Bombay Millowners' Association ..	Sir Sorab Saklatvala, M.L.A.
The Bombay Chamber of Commerce ..	Mr. L. F. H. Goodwin.
The Indian Merchants' Chamber ..	Sir Chunilal B. Mehta. (*Vice-President.*)
The Karachi Chamber of Commerce ..	Mr. A. P. Darlow.
The Ahmedabad Millowners' Association	Mr. Ramanlal Lallubhai.
The Tuticorin Chamber of Commerce ..	Mr. J. L. Hurschler.
The Upper India Chamber of Commerce ..	Captain S. R. Pocock, M.C., M.L.A.
The Empire Cotton Growing Corporation ..	Sir William Roberts, C.I.E.

(5) COMMERCIAL REPRESENTATIVES NOMINATED BY CENTRAL GOVERNMENT—

Central Provinces and Berar	Rao Saheb P.V. Deshmukh. Mr. Y. G. Deshpande.
Madras	Mr. J. R. Marshall.
Punjab	Sardar Bahadur Sardar Ujjal Singh.

(6) *Bengal representative* .. .. .. Mr. Suryya Kumar Basu,

(7) CO-OPERATIVE BANKING REPRESENTATIVE—Sir Chunilal V. Mehta, K.C.S.I.

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

Madras	Mr. K. V. Othimalai Gounder. Mr. L. Madhava Reddi.

Bombay	Mr. S. T. More, Rao Saheb F. B. Laxmeshwar.
United Provinces	Khan Bahadur M. Ahmad Hussain Khan, Rai Bahadur Kunwar Laxmi Raj Singh, M.L.C.
Punjab	Khan Bahadur Ch. Riasat Ali, M.L.A., Rai Saheb Ch. Surajmal, M.L.A.
Central Provinces and Berar	Rao Bahadur Sir Madhaorao Deshpande, K.B.E., Rao Bahadur Uttamrao Patil.
Sind	Mr. Roger Thomas, C.I.E.

(9) AND (10) REPRESENTATIVES OF INDIAN STATES—

Hyderabad State	Rai Saheb Kalidas Sawhney, Director of Agriculture (Research.)
Baroda State	Mr. R. G. Allan, C.I.E., Commissioner of Agriculture.
Gwalior State	Mr. N. M. Deshmukh, Director of Agriculture.
Rajputana and Central India States ..	Rao Bahadur V. A. Tamhane.

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN COUNCIL :—

1. Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Northern Division, Surat.
2. Mr. M. J. Narasimhan, Director of Agriculture in Mysore, Bangalore.
3. Rao Bahadur V. Ramanatha Ayyar Avl., Cotton Specialist and Geneticist, Coimbatore.
4. Muntazim-i-Khas Bahadur Capt. H. C. Dhanda, Commerce Minister, Holkar state, Representative of the Holkar State.
5. Representative of the Karachi Indian Merchants' Association.—Vacant.
6. Dr. B. L. Sethi, Deputy Director of Agriculture Western Circle, Aligarh.
7. The Hon'ble Mr. V. Ramdas Pantulu, President, Madras Provincial Co-operative Bank, Madras.
8. Sir Shri Ram, Representative of the Cotton Millowners of Delhi.
9. Representative of the Karachi Cotton Association Ltd.—Vacant.
10. Dewan Bahadur Sir T. Vijayaraghavacharya, K. B. E.
11. Dr. P. J. Gregory, Second Economic Botanist, Bengal.
12. Sir Theodore Gregory, Economic Adviser to the Government of India.
13. Mr. Camar Tyabjee, Managing Agent, Osman Shahi and Azamjahi Mills, Hyderabad (Deccan).
14. Sir Padampat Singhania, Senior Proprietor, Messrs. Jugilal Kamlapat, Cawnpore.
15. Mr. R. G. Saraiya, O.B.E., J.P., Messrs. Naraindas Rajaram & Co., Bombay.

APPENDIX II.

SUB-COMMITTEES.

Standing Finance Sub-Committee.—Sir Chunilal B. Mehta (Vice-President), Chairman; Sir Pheroze Kharegat (*ex-officio*); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Sir Chunilal V. Mehta; Mr. J. L. Hurschler; Mr. W. J. Jenkins; Rao Bahadur Sir Madhaorao Deshpande and Mr. R. G. Saraiya.

Local Sub-Committee.—President (Sir Pheroze Kharegat); the Vice-President (Sir Chunilal B. Mehta); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Sir Chunilal V. Mehta; Mr. J. L. Hurschler; Mr. L.F.H. Goodwin; Mr. R.G. Saraiya; Mr. W. J. Jenkins; Mr. A. P. Darlow; Rao Bahadur Sir Madhaorao Deshpande and Mr. S. T. More.

Agricultural Research Sub-Committee.—

I. *The President*—Sir Pheroze M. Kharegat (*ex-officio*),

II. *The Vice-President*—Sir Chunilal B. Mehta (*ex-officio*),

III. *The Co-operative Banking Representative*—Sir Chunilal V. Mehta (*ex-officio*),

IV. *Cotton Growers' Representatives.*—Sir William Roberts, Mr. Roger Thomas, Rao Bahadur Sir Madhaorao Deshpande,

V. *Cotton Trade Representatives.*—Sir Purshotamdas Thakurdas, Mr. R.G. Saraiya Mr. J. L. Hurschler, Mr. L. F. H. Goodwin,

VI. *Agricultural Officers.*—The Agricultural Commissioner with the Government of India (*ex-officio*), Mr. W. J. Jenkins, Mr. P. H. Rama Reddi, Mr. C. Mayadas, Mr. R. G. Allan, Rai Saheb Kalidas Sawhney, Mr. N. M. Deshmukh, Mr. J. C. McDougall, Mr. M. J. Narasimha Iyengar, Rao Bahadur S. S. Salimath, Rao Bahadur V. A. Tamhane.

VII. *Additional Members.*—Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Chunilal V. Mehta, Mr. Mohammad Afzal, Mr. K. Ramiah, Professor R. H. Dastur, Rao Bahadur V. Ramanatha Ayyar, Dr. B. L. Sethi, Dr. R. Sankaran, Mr. S. S. Pande, Dr. V. G. Panse, Dr. B. N. Uppal, Dr. P. J. Gregory, Dr. H. K. Nandi, Dr. Nazir Ahmad, Mr. P. D. Gadkari, Dr. B. S. Kadam.

VIII. The Secretary.

Technological Research Sub Committee.—The President—Sir Pheroze M. Kharegat (*ex-officio*), The Vice-President—Sir Chunilal B. Mehta (*ex-officio*), The Agricultural Commissioner with the Government of India (*ex-officio*), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Sir Chunilal V. Mehta, Sir William Roberts, Sir Shri Ram, Sir Padampat Singhania, Mr. W. J. Jenkins, Mr. P. H. Rama Reddi, Mr. L. F. H. Goodwin, Capt. S. R. Pocock, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Rao Saheb P. V. Deshmukh, Dr. Nazir Ahmad, Rao Bahadur V. Ramanatha Ayyar, Rai Saheb Kalidas Sawhney, Mr. Y. G. Deshpande, Mr. K. Ramiah, Mr. Roger Thomas, Dr. R. Sankaran, Dr. B.L. Sethi, Dr. K. Venkataraman, Rao Bahadur Uttamrao Patil, the Director of Industries, Bombay, The Principal, Victoria Jubilee Technica

Institute, Bombay, Mr. A. D. Walwyn and Mr. G. C. Abbott (Representing the Bombay Millowners' Association), Mr. Narottam, P. Hutheesing and Mr. Rasiklal C. Nagri (Representing the Ahmedabad Millowners' Association) and Mr. Gatulal Rangildas and Mr. Chimanlal B. Parekh (Representing the East India Cotton Association, Ltd.).

Cotton Forecast Sub-Committee.—The President (*ex-officio*), The Vice-President, the Agricultural Commissioner with the Government of India (*ex-officio*), The Deputy Economic Adviser to the Government of India, the Director of Agriculture, Bombay Province, the Director of Agriculture, Punjab, the Director of Agriculture, Madras, The Director of Agriculture, United Provinces, the Director of Agriculture, Central Provinces and Berar, the Director of Agriculture, Sind, the Director of Agriculture, (Research), H.E.H. the Nizam's Government, the Commissioner of Agriculture, Baroda, the Director of Statistics, H. E. H. the Nizam's Government, the Director of Land Records, Central Provinces and Berar, the Director of Statistics, Calcutta, the Statistical Officer, Department of Industries and Commerce, Madras, Sir Theodore Gregory, Mr. J. L. Hurschler, Mr. L. F. H. Goodwin, Sir William Roberts, Sir Chunilal V. Mehta, Mr. Roger Thomas and Dr. V. G. Panse.

Cotton Ginning and Pressing Factories Sub-Committee.—The President—Sir Pheroze M. Kharegat, the Vice-President—Sir Chunilal B. Mehta (*ex-officio*), the Co-operative Banking Representative—Sir Chunilal V. Mehta (*ex-officio*), Sir Purshotamdas Thakurdas, Sir Sorab Saklatvala, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Sir William Roberts, Mr. W. J. Jenkins, Rao Saheb P. V. Deshmukh, Capt. S. R. Pocock, Mr. L. F. H. Goodwin, Rao Saheb F. B. Laxmeshwar, Mr. J. C. McDougall and Dr. Nazir Ahmad.

Standards Sub-Committee.—This Sub-Committee was not constituted as the preparation of Universal Standards has been held in abeyance for the duration of the war.

APPENDIX III.

BALANCE SHEET AS ON 31ST MARCH, 1943.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Cotton Cess Receipts	1,50,12,308 0 4		I. A. Administration		23,22,501 4 0
Less: Refunds of cess to Burma	42,369 10 9	1,49,69,938 5 7	B. *Improvement of Cotton Marketing:*—		
Interest account:—			1. Cost of exhibits, travelling allowance of representatives on the Board of East India Cotton Association and members of Standards Sub-Committee and cost of Standards	1,83,080 7 9	
Amount received on investments	22,29,097 6 3		2. Enquiry into cost of cotton production in India	2,71,963 8 9	
Add: Refund of incometax from interest ..	26,949 15 0				4,55,044 0 6
	22,56,047 5 3		C. *Seed Distribution & Extension Schemes:*—		
Less:—			(i) *Bombay.*—		
1. Interest paid in advance at the time of purchasing Government papers (since recovered), interest on temporary overdrafts and Bank's commission for collection of interest	63,491 15 6		(1) Hubli	44,048 8 3	
2. Interest credited to Provident Fund ..	4,886 6 2		(2) Gadag	41,700 15 1	
3. Bank's withdrawal charges	5,536 6 0		(3) Gadag (Supplementary) ..	20,167 11 4	
4. Incometax on interest on Government papers	30,227 13 3		(4) Surat	90,201 9 10	
5. Brokerage for securities sold	828 10 0		(5) Athani	18,086 1 7	
6. Provision for Sinking Fund	17,517 8 0		(6) Khandesh (Banilla)	1,65,580 4 0	
	1,22,488 10 11	21,33,558 10 4	(7) Khandesh (Jarila)	1,13,543 10 9	
Profit on conversion and sale of securities ..		3,47,382 12 2	(8) Deccan Canals (Banilla) ..	3,333 7 4	
Sinking Fund account		17,517 8 0	(9) B. D.8	35,427 9 3	
Miscellaneous Receipts		1,29,829 8 4	(10) Revised Jayawant & Gadag No. 1	1,97,856 11 1	
Refund from Provident Fund for contributions disallowed		3,391 1 11	(11) Maintenance of nucleus of pure seed of improved varieties of cotton	9,664 6 3	
General Suspense account		212 14 3	(12) Scheme for control of Selection 1A	4,202 11 0	
			(13) Collection of 1027 A. L. F. cotton in Navapur Taluka ..	876 0 0	
Carried over ..		1,76,01,830 12 7	Total ..	7,44,689 9 9	27,77,545 4 6

BALANCE SHEET AS ON 31ST MARCH, 1943—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,76,01,830	12	7	Brought forward ..	7,44,689	9	9	27,77,545	4	6
							(*ii*) *Madras* :—						
							(1) Pay and allowance of Business Manager, Tiruppur	24,079	13	0			
							(2) Co.2	41,286	2	9			
							(3) H.1	7,007	2	9			
							(4) Maintenance of nucleus of pure seed of improved varieties of cotton	2,747	8	8			
							(5) Co.3 in Salem District	3,001	14	0			
							Total ..	78,122	9	2			
							(*iii*) *Sind* :—						
							(1) Seed Distribution	4,11,251	12	4			
							(2) Maintenance of nucleus of pure seed of improved varieties of cotton	9,862	13	5			
							(3) Financing of seed distribution	35,000	0	0			
							Total ..	4,56,114	9	9			
							(*iv*) *Hyderabad*	53,471	6	3			
							(*v*) *Central Provinces* :—						
							Maintenance of nucleus of pure seed of improved varieties of cotton	3,274	11	0			
							(*vi*) *Baroda* :—						
							(1) Navsari Seed Storage	29,452	10	10			
							(2) B. D.8	12,522	11	9			
							(3) B. 9	1,555	0	0			
							Total ..	43,530	6	7			
							(*vii*) Lyallpur (Ginnery)	16,038	3	3			
							(*viii*) (1) United Provinces C. 402 ..	18,616	11	6			
							(2) Perso-American cotton in western district	9,715	0	0			
							Total ..	28,331	11	6			
											14,23,573		
Carried over ..				1,76,01,830	12	7	Carried over ..				42,01,118	7	

BALANCE SHEET AS ON 31ST MARCH, 1943—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,76,01,830 12 7	Brought forward —		42,01,118 7 9
			D. *Printing & Propaganda* :—		
			(1) Publicity & Propaganda ..	1,56,555 15 0	
			(2) Printing & Distribution	1,21,253 10 0	
					2,77,809 9 0
			E. *Statistical Research* :—		
			(1) Studies of village consumption of Indian cotton	23,913 5 8	
			(2) Improvement of Cotton Forecast ..	30,772 9 0	
			(3) Crop estimating survey on cotton in Central Provinces	4,361 0 0	
					59,046 14 8
			F. *Travelling Allowance* :—		
			Non-official Members		2,69,855 10 9
			II. *Technological Research* :—		
			1. *Technological Laboratory*)—		
			A. (Capital expenditure—		
			(1) Land & Buildings	4,07,988 14 6	
			(2) Machinery	1,23,212 1 2	
			(3) Freight	7,502 2 8	
			(4) Appparatus & Equipment ..	41,668 5 7	
			(5) Machinery & Workshop ..	5,789 8 3	
			B. *Working Expenses*	28,58,137 11 11	
			(2) Provincial	2,17,286 11 0	
			(3) Development of alternative uses of Indian cottons :—		
			(*a*) Capital Expenditure	29,006 7 9	
			(*b*) Working Expenditure ..	43,199 11 5	
			(4) Investigation for improvement in the ginnign of Indian cotton :—		
			(*i*) Capital Expenditure	34,072 13 9	
			(*ii*) Working Expenditure ..	11,540 1 9	
					37,79,404 9 9
			III. Research Studentships	2,82,549 10 4	
			Less—Refund from Mr. Taskhir Ahmed ..	2,737 8 0	
					2,79,812 2 4
Carried over ..		1,76,01,830 12 7	Carried over ..		88,67,047 6 8

BALANCE SHEET AS ON 31ST MARCH, 1943—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,76,01,830	12	7	Brought forward ..				88,67,047	6	3
							IV. AGRICULTURAL RESEARCH SCHEMES.						
							(i) *Bombay* :—						
							1. A. Surat Physiological	2,45,139	11	3			
							B. Surat Physiological Writing-up	5,814	7	8			
							2. A. Surat Bollworm	1,14,509	9	7			
							B. Surat Bollworm Propaganda ..	91,468	9	2			
							C. Surat Bollworm Writing-up ..	2,315	3	0			
							3. A. Dharwar Wilt	1,82,836	4	11			
							B. Dharwar Wilt Writing-up ..	10,902	10	3			
							4. Khandesh	26,573	5	0			
							5. Co-ordination of Cotton Research	1,749	7	6			
							6. Jalgaon Cotton Breeding ..	71,273	3	9			
							7. Broach Cotton Breeding	99,208	0	11			
							8. Small Leaf Disease Survey ..	3,938	9	6			
							9. Survey of Goghari Cotton ..	4,199	5	0			
							10. Defibration of cotton Seeds ..	4,878	5	9			
							11. Plant Puller Propaganda ..	21,940	1	3			
							12. Breeding of Wilt Resistant Cotton for Surat Area	15,479	0	0			
							13. Model Projects for improvement of cotton cultivation etc.	1,098	0	0			
							14. Inclusion of Northerns & Westerns in Dry Farming Research at Bijapur	6,953	12	7			
							15. Poona Wilt Breeding	48,495	3	6			
							16. Improvement of Cotton Crop in Kaira District	2,846	2	6			
							17. Interspecific Hybridisation at Surat	33,804	1	3			
							18. Dhollera Wagad Cotton at Viramgam	30,215	5	11			
							19. Improvement of Dharwar-American cotton	2,964	0	0			
							Total ..	10,28,602	8	3			
Carried over..				1,76,01,830	12	7	Carried over ..	10,28,602	8	3	88,67,047	6	3

BALANCE SHEET AS ON 31ST MARCH, 1943—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,76,01,830	12	7	Brought forward ..	10,28,602	8	3	88,67,047	6	3
							(*ii*) *Madras* :—						
							1. Herbaceum	1,42,466	13	1			
							2. Pempheres and Physiological ..	1,99,866	15	1			
							3. Fodder Cholam	19,517	9	4			
							4. Breeding of Nadam cotton ..	17,727	2	6			
							5. Improvement of Mungari cotton	27,238	3	9			
							6. Investigation of the possibilities for control of cotton stem weevil	6,165	7	6			
							7. Improvement of Coconadas cotton	22,142	7	6			
							Total ..	4,35,124	10	9			
							(*iii*) *Punjab* :—						
							1. Botanical	6,31,864	15	9			
							2. Entomological	2,25,908	7	11			
							3. White Fly	48,721	4	1			
							4. Root Rot	71,048	10	10			
							5. Spraying Trials	9,977	0	6			
							6. Defibrating and Delinting ..	6,112	8	9			
							7. Survey of Disease of Malformation	1,730	10	6			
							8. Physiological	3,56,399	15	7			
							9. Clean-up Campaign of Spotted Bollworm	60,025	9	3			
							10. Jassid Investigation	16,377	6	6			
							11. Improvement of Punjab-American 289F	12,898	8	3			
							Total ..	14,41,065	1	11			
Carried over ..				1,76,01,830	12	7	Carried over ..	29,04,792	4	11	88,67,047	6	3

BALANCE SHEET AS ON 31ST MARCH, 1942—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,76,01,880	12	7	Brought forward ..	29,04,792	4	11	88,67,047	6	3
							(*iv*) *Central Provinces* :—						
							1. Botanical	4,93,449	9	4			
							2. Entomological	12,344	13	6			
							3. Investigation of Heliothis Obsoleta	1,672	9	9			
							4. Central Provinces & Berar Cotton Breeding	37,847	2	3			
							5. Model Projects for extension of improvement in cultivation of crops	1,242	0	0			
							Total ..	5,46,556	2	10			
							(*v*) *United Provinces* :—						
							1. Pink Bollworm	1,46,616	2	10			
							2. Rohilkhand & Bundelkhand Survey	18,061	14	4			
							3. Botanical	74,353	5	9			
							4. Model Project for extension of improvement in cultivation of crops	866	0	0			
							Total ..	2,39,897	6	11			
							(*vi*) *Indore* :—						
							1. Institute of Plant Industry ..	19,56,943	12	0			
							2. Cotton Genetics Research Scheme	1,08,228	0	2			
							Total ..	20,65,171	12	2			
Carried over ..				1,76,01,880	12	7	Carried over ..	57,56,417	10	10	88,67,047	6	3

BALANCE SHEET AS ON 31ST MARCH, 1943—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,76,01,880	12	7	Brought forward ..	57,56,417	10	10	88,67,047	6	3
							(*vii*) *Sind* :—						
							1. Physiological	2,63,945	12	10			
							2. Jassid Investigation	14,682	8	1			
							3. Black-headed Cricket	9,245	1	3			
							4. Scheme for Investigation for production of long staple cotton ..	73,218	5	10			
							5. Bollworm Investigation and Clean up Scheme	51,897	11	6			
							Total ..	4,12,989	7	6			
							(*viii*) *Burma* :—						
							1. Capital Expenditure	2,906	15	5			
							2. Cotton Improvement	47,790	3	9			
							Total ..	50,697	3	2			
							(*ix*) *Hyderabad* :—						
							1. Botanical	4,06,013	5	11			
							2. Cotton Survey	36,578	3	0			
							3. Pink and Spotted Bollworm ..	83,976	10	4			
							4. Improvement of Kumpta cotton	33,349	15	10			
							5. Inclusion of Northerns and Westerns in Dry Farming Scheme at Raichur	2,000	4	0			
							6. Pink and Spotted Bollworm Clean-up Campaign	53,929	2	0			
							7. Improvement of cottons of the Oomras tract	16,765	10	0			
							Total ..	6,32,613	3	1			
Carried over ..				1,76,01,880	12	7	Carried over ..	68,52,717	8	7	88,67,047	6	3

BALANCE SHEET AS ON 31ST MARCH, 1943—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Re. a. p.
Brought forward ..		1,76,01,830 12 7	Brought forward ..	68,52,717 8 7	88,67,047 6 3
			(*x*) *Bikaner* :—		
			Bengals Cotton Improvement ..	67,651 9 11	
			(*xi*) *Baroda* :—		
			1. Root Rot	91,833 2 2	
			2. Comparative Tests	4,251 5 3	
			3. Survey of Goghari cotton ..	3,891 14 7	
			4. Plant Puller Propaganda ..	32,533 15 10	
			5. Mathio cotton at Amreli and Jagudan	23,752 11 9	
			Total ..	1,56,263 1 7	
			(*xii*) *Bengal* :—		
			1. Comilla Scheme	44,668 1 9	
			2. Cultivation of Long Staple cotton	5,814 13 0	
			Total ..	50,482 14 9	
			(*xiii*) Mysore Doddahathi	20,675 12 9	
			(*xiv*) Collection of Iran cottons	3,121 12 0	
			(*xv*) *Baluchistan*—Co-ordination of research on Black-headed Cricket in Sind and Baluchistan	22,181 10 5	
			(*xvi*) Preliminary Scheme at Nawanagar ..	323 12 4	
			(*xvii*) Estimation of effects on cotton crop of the use of Plant Puller ..	4,143 12 5	71,77,561 14 9
Carried over ..		1,76,01,830 12 7	Carried over ..		1,60,44,609 5 0

BALANCE SHEET AS ON 31ST MARCH, 1943—(*concld.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,76,01,830 12 7	Brought forward ..		1,60,44,609 5 0
			V. *Marketing Schemes :—*		
			1. Grading and Marking of 1027 A.L.F. in Surat area	2,119 2 9	
			2. Punjab Cotton Marketing Survey ..	7,214 1 6	
			3. Baroda Better Marketing of 1027 A. L. F.	11,653 6 3	
			4. Extension and Marketing of V. 434 C. P.	3,35,948 1 7	
			5. Distribution and Marketing of Buri 107 Cotton in Burhanpur Tahsil..	19,323 5 0	3,76,253 1 1
			VI. *Miscellaneous Schemes :—*		
			1. Compilation of Manurial Trials ..	719 15 0	
			2. Compilation of Hand-book dealing with pests and diseases of cotton in the Empire	2,975 5 0	
			3. Survey of nutritional values in relation to milch buffaloes of fuzzy cotton seed and cotton seed cakes manufactured from such seeds ..	12,800 0 0	
			4. Spread of Jarila cotton in Central Provinces	611 5 0	17,106 9 0
			By suspense account	3,496 7 5	
			BY BALANCE ..	11,60,365 6 1	11,63,861 13 6
Carried over ..		1,76,01,830 12 7	GRAND TOTAL		1 76,01,830 12 7

PROVIDENT FUND ACCOUNT.

Balance Sheet as on 31st March, 1943.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Subscribers' contribution account	4,52,093 6 6		Advance to subscribers	1,02,051 1 0	
Less: Payment made to subscribers resigned	1,54,271 8 2	2,97,821 14 4	*Less:* Recoveries made up to 31-3-1943 ..	78,719 3 0	23,331 14 0
Committee's contribution account	4,42,303 9 4		Accrued interest on Government Paper credited to subscribers for distribution up to 31-3-43		3,809 4 8
Less: Payment made to subscribers resigned and forfeitures for Committee's contribution disallowed	1,49,275 12 0	2,93,027 13 4	By Balance as per details attached		6,07,094 13 10
Lapse and Forfeiture account		7,117 4 8			
Net interest received on investments		17,133 11 0			
Investment and fluctuation account		17,238 6 1			
Suspense receipts :—					
Amount due to subscriber deceased—Mr. N Sreenivas	500 0 0				
Suspense deposit of Mr. Dutt's own contribution	1,309 7 1				
Contribution received from Capt. Kharkar ..	87 8 0	1,896 15 1			
Total ..		6,34,236 0 6	Total ..		6,34,236 0 6

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1943.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	PAYMENTS.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1942	14,80,620 1 10			*Administration of the Committee.*—(Including Improvement of Cotton Marketting, Printing, Publicity, and Distribution, and Travelling Allowance of non-official members)		1,65,238 11 3
Sinking Fund	16,050 10 0					
		14,96,670 11 10				
Less—Adjustments of Suspense Receipts received during 1941-42		278 8 0		*Agricultural Research Grants-in-Aid.*—(Including Research, Seed, Marketing and Miscellaneous Schemes)		4,88,157 2 1
			14,96,392 3 10			
Receipts under Section 12 of the Indian Cotton Cess Act, 1923			4,51,298 5 10	*Technological Research*		2,08,899 10 2
Other Receipts.				*Closing Balance :*—		
				(Government Paper at cost).		
Sale of Publications, sale of cotton, miscellaneous receipts, tests fees, etc...	19,671 9 1			3% Government of India Defence Bonds, 1946 of the Face Value of Rs. 3,97,500 ..	3,94,234 11 0	
Suspense Receipts ..	212 14 3			*3½% Government of India Loan, 1947-50 of the Face Value of Rs. 4,50,000 ..	3,93,314 1 0	
Sinking Fund Provision for 1942-43	1,466 14 0			4½% Government of India Loan, 1955/60 of the Face Value of Rs. 26,600 ..	25,004 0 0	
		21,351 5 4				
Interest on Investments ..		57,115 6 0		6% Bombay Municipal Debentures, 1954 of the Face Value of Rs. 10,000 ..	3,950 0 0	
			78,466 11 4	6% Rangoon Municipal Debentures, 1955 of the Face Value of Rs. 3,83,500 ..	4,15,328 2 0	
					12,31,830 14 0	
				(Market value on 31st March, 1943—Rs. 13,34,283-3-0, inclusive of Rangoon Municipal Debentures, taken at cost) ..		
				*An overdraft of Rs. 76,118-4-11 with the Imperial Bank of India has been secured against the hypothication of 3½% Government of India Loan, 1947/50 of the Face Value of Rs. 1,50,000.		
Carried over ..			20,26,157 5 0	Carried over ..	12,31,830 14 0	8,62,295 7 6

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1943—(*concld*).

RECEIPTS	Rs. a. p.	Rs. a. p.	Rs. a. p.	PAYMENTS	Rs. a. p.	Rs. a. p.
Brought forward ..			20,26,157 5 0	Brought forward	12,31,830 14 0	8,62,295 7 6
				Imprests :— Rs. a. p.		
				(1) Secretary's Office .. 1,577 13 0		
				(2) Director, Technological Laboratory 500 0 0		
				(3) Director of Agriculture, Bombay 1,270 0 0		
				(4) Director of Agriculture, Sind 725 0 0		
				(5) Cotton Research Botanist, Lyallpur 150 0 0		
				(6) Plant Physiologist, Punjab 100 0 0		
				(7) Geneticist and Botanist, Indore 300 0 0		
				(8) Agricultural Chemist, Lyallpur 30 0 0		
					4,652 13 0	
				Suspense (Recoverable) ..	3,496 7 5	
					12,39,980 2 5	
				Less :—Overdraft Account with the Imperial Bank of India, Bombay, (against hypothication of 3½% Government of India Loan, 1947/50, of the Face Value of Rs. 150,000)	76,118 4 11	
				§ Total Closing Balance		11,63,861 13 6
				Total ..		20,26,157 5 0
Total.. ..			20,26,157 5 0	§ Includes Rs. 17,517-8-0 on account of Sinking Fund.		

We have examined the above Statement of Receipts and Payments of Indian Central Cotton Committee with the Books, Vouchers and Certified Returns of the Committee, have obtained all the information and explanations we have required, and certify that to the best of our information and explanations received, the above Statement is a correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the Indian Cotton Cess Act, 1923.

BOMBAY, 23*rd June*, 1943.

(Sd.) S. B. BILLIMORIA & CO.,
Registered Accountants Auditors.

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH, 1943.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1942	5,24,828 7 3			*Balance :—*		
				(Government Paper at Market Value).		
Less—Adjustment of Suspense Receipts	5 1 0			3% Government of India Defence Bonds 1946 of the Face Value of Rs. 2,72,300 ..	2,80,298 13 0	
		5,24,823 6 3				
Subscribers' contributions ..	31,353 14 0			3% Government of India Loan, 1951/54 of the Face Value of Rs. 32,000 ..	32,026 10 8	
Add—Recoveries against advances	11,456 8 0			3½% Government of India Loan, 1947/50 of the Face Value of Rs. 1,20,000 ..	1,24,725 0 0	
		42,810 6 0				
		5,67,633 12 3		4% Government of India Loan, 1960/70 of the Face Value of Rs. 12,600 ..	13,907 4 0	
Less—Refunds to subscribers who have resigned ..	8,315 9 5			2½% Government of India Loan, 1948/52 of the Face Value of Rs. 70,000 ..	69,387 8 0	
Advances to subscribers ..	22,704 8 0	31,020 1 5				
		5,36,613 10 10		3% Government of India Loan, 1949/52 of the Face Value of Rs. 35,000 ..	35,153 2 0	
Committee's contribution received from Indian Central Cotton Committee		31,353 14 0		*Savings Bank Account* with the Imperial Bank of India, Bombay	15,391 15 0	
		5,67,967 8 10		*Current Account* with the Imperial Bank of India, Bombay	36,204 9 2	6,07,094 13 10
Less—Payments made to subscribers who have resigned, including transfers to "Lapse and Forfeiture" Account for contributions disallowed		8,151 2 4				
			5,59,816 8 6			
Interest received on Investments	16,378 6 0					
Interest received on Advances to subscribers	198 9 7					
Refund of Income-tax deducted on interest received during 1941-42	819 9 0					
		17,396 8 7				
Carried over..		17,396 8 7	5,59,816 8 6	Carried over..		6,07,094 13 10

PROVIDENT FUND ACCOUNT AS AT 31st MARCH, 1943—*(concld)*.

	Rs. a. p.	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.
Brought forward..		17,396 8 7	5,59,816 6 6	Brought forward ..		6,07,094 13 10
Less—Interest paid during the year to subscribers who have resigned—On their own contributions ..	113 3 0					
On Committee's contributions	114 2 7					
Interest paid in advance at the time of purchase of Government Securities (since received)	209 9 0					
Cost of Stationery, etc. ..	29 0 0					
Bank's commission for collection of interest and cost of stamps	21 9 0	487 7 7	16,909 1 0			
Investments Fluctuation Account:—Net appreciation in Market of Value Securities			30,192 2 8			
Lapse and Forfeiture Account			89 11 8			
Suspense Receipts—Being contributions received from Capt. Kharkar			87 8 0			
Total.. ..			6,07,094 13 10	Total ..		6,07,094 13 10

Examined and found correct.
(Sd.) S. B. BHIMORIA & Co.,
Registered Accountants, Auditors

BOMBAY, 23*rd June*, 1943

APPENDIX IV

STOCKS OF INDIAN COTTON ON 31ST JANUARY, 1943 HELD BY THE MILLS AND THE TRADE IN MADRAS PROVINCE.

(In thousand bales of 400 lbs. each.)

Trade Descriptions of Cotton.	Mill stocks on 31st January					Trade stocks on 31st January					Total stocks on 31st January				
	1939.	1940.	1941.	1942.	1943.	1939.	1940.	1941.	1942.	1943.	1939.	1940.	1941.	1942.	1943.
Tinnevellies	32	20	18	27	31	4	2	14	17	15	36	22	32	44	46
Salems	16	4	9	10	20	8	3	2	6	5	24	7	11	16	25
Cambodias	71	33	34	66	99	17	5	21	38	39	88	38	55	104	138
Northerns & Westerns	19	15	23	25	27	18	2	16	10	32	37	17	39	35	59
Cocanadas	1	1	1	4	3	14	8	9	19	5	15	9	10	23	8
Outside Cottons ..	27	49	56	61	55	..	..	..	4	1	27	49	56	65	56
Total ..	166	122	141	193	235	61	20	62	94	97	227	142	203	287	332

APPENDIX V

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS.

(Based on returns made under the Indian Cotton Cess Act, 1923, by mills in British India, and on voluntary returns from mills in Indian States).

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	†1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.
Bombay Island ..	542,036	766,375	664,546	611,606	565,084	491,709	687,287	664,199	636,720	782,815	750,317	634,149	982,084	1,057,745	1,270,766
Ahmedabad	318,983	344,021	321,503	322,257	348,009	373,345	326,558	320,982	304,398	346,269	346,375	305,459	341,800	414,870	364,999
Bombay Province ..	1,044,925	1,300,859	1,173,659	1,132,645	1,116,297	1,063,549	1,230,616	1,189,310	1,128,744	1,353,998	1,316,313	1,172,285	1,580,079	1,764,339	1,939,423
Madras Province ..	204,284	211,488	214,759	260,707	292,013	278,060	312,164	365,423	412,268	422,573	480,839	507,391	525,611	594,054	647,407
United Provinces ..	182,462	234,205	235,623	256,820	273,573	277,230	292,424	317,011	299,073	288,320	356,331	349,340	381,025	427,305	437,441
Central Provinces and Berar	121,391	123,146	118,492	115,018	111,208	112,660	125,014	130,298	122,987	146,587	164,616	142,868	153,825	178,791	174,385
Bengal..	84,212	99,075	91,993	102,390	103,784	107,633	101,101	98,892	79,944	92,546	90,611	111,383	135,227	125,740	136,098
The Punjab and Delhi.	54,575	64,464	73,736	89,681	80,854	71,939	83,897	89,430	93,886	94,742	133,347	165,274	171,652	179,987	175,955
Rest of British India .	22,189	24,458	27,101	30,342	31,935	35,139	38,575	38,010	35,823	46,840	49,806	44,867	47,316	64,804	59,003
Total—British India..	1,714,038	2,057,695	1,935,363	1,987,603	2,009,664	1,946,210	2,183,791	2,228,374	2,172,725	2,445,606	2,591,863	2,493,408	2,994,735	3,335,024	3,569,712
Total—Indian States.*	277,540	315,399	333,996	358,793	351;260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375	711,105
TOTAL– INDIA ..	1,991,578	2,373,094	2,269,359	2,346,396	2,360,924	2,336,326	2,612,132	2,677,688	2,632,785	2,999,609	3,151,065	3,050,106	3,617,147	4,025,395	4,280,817

* Figures for Indian States up to and including 1930-31, being based on yarn production returns, include foreign cotton also.

† From April 1937 figures for Burma have been excluded.

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES.

(Based on voluntary returns from mills in Indian States).

N.B.—Figures up to and including 1930-31, being based on yarn production, include foreign cotton also.

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.
Hyderabad	19,067	20,823	23,074	31,290	33,488	33,231	45,588	51,771	49,981	63,993	68,156	67,995	72,860	83,725	83,689
Mysore	39,619	46,590	43,326	49,293	50,596	47,168	51,196	50,824	53,236	55,244	53,853	67,851	65,062	74,966	77,734
Baroda	48,852	59,043	62,578	58,534	50,587	53,612	57,146	51,963	51,761	70,686	73,278	65,573	91,519	90,642	87,542
Gwalior	36,708	41,463	45,207	45,892	43,306	49,362	56,318	72,163	79,079	89,243	94,090	88,688	95,517	94,300	90,025
Indore	76,070	83,026	88,620	95,296	91,036	111,430	114,229	113,379	106,454	147,766	140,792	120,186	138,795	148,867	139,914
Kathiawar States ..	} 7,224	64,454	{ 20,283	18,849	18,868	26,506	35,438	37,397	42,717	48,545	44,109	43,703	50 479	60,628	65,067
Other Indian States ..			32,558	39,382	40,209	45,197	45,735	51,462	57,767	57,119	58,444	} 102,702	108,180	137,247	157,184
Pondicherry			18,350	20,257	23,170	23,610	22,691	20,355	19,065	22,307	26,475				
Total—Indian States.	277,540	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375	711,105

LOOSE (UNPRESSED) INDIAN RAW COTTON CONSUMED IN MILLS IN BRITISH INDIA.

(Based on voluntary returns furnished by mills.)

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1928-29.	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	‡1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1942-42.	1942-43.
Bombay Province ..	27,324	24,361	54,409	74,979	80,092	74,868	58,355	75,617	67,219	74,750	80,164	86,687	96,215	102,965	81,643
Madras Province ..	52,188	46,582	55,717	99,389	96,340	110,875	123,260	147,044	173,102	156,675	162,489	175,540	189,257	230,691	241,751
United Provinces ..	13,878	20,441	18,496	14,367	19,236	17,871	10,090	10,405	10,659	15,719	17,532	20,279	29,127	26,293	5,024
Central Provinces and Berar	6,924	16,243	15,771	26,743	17,462	18,382	20,544	27,502	26,321	32,860	26,980	29,052	32,589	31,178	19,153
Bengal*	..	..	..	..	..	..	..	..	90	..	..	3	..	..	483
The Punjab & Delhi†	3,760	4,361	4,307	2,317	2,149	..	5,535	3,110	28,385	23,873	25,960	33,079	28,627	30,986	22,044
Rest of British India*	..	..	..	..	..	..	..	..	19,282	17,160	22,916	12,734	15,529	21,280	6,804
Total—British India..	104,074	111,988	148,700	211,795	215,279	221,996	217,784	263,678	325,058	321,037	336,041	357,374	391,344	443,393	376,902
Indian States* ..	..	..	..	..	..	..	..	..	131,149	109,003	122,078	116,962	131,657	118,660	82,083
Total—INDIA*	..	..	..	..	..	..	..	..	456,207	430,040	458,119	474,336	523,001	562,053	458,985

*Figures up to 1935-36 not compiled. † Figures up to 1935-36 exclude Delhi.

‡ From 1936-37 the figures refer to consumption and not receipts and are based on returns furnished under the Indian Cotton Cess Act, 1923, by mills in British India and on voluntary returns from mills in Indian States. From April 1937 figures for Burma have been excluded.

TWENTY-THIRD ANNUAL REPORT

of the

INDIAN CENTRAL COTTON COMMITTEE

for the year ended

31st AUGUST,

1944

Price, Rs. 2.

CONTENTS.

PAGE

CHAPTER I.

Introductory 1

CHAPTER II.

Cotton Statistics .. .. 6—14
Indian cotton situation—1943-44. 6
Report on the staple length of Indian cotton crop 9
Demand for various types of Indian cotton 9
Stocks 10
Indian mill consumption 10
Exports 11
Statistics of cotton pressed 11
Unpressed (loose) cotton statistics 11
Statistics of cotton ginned 11
Improvement of cotton forecasts 12
Scheme for crop estimating survey on cotton in the Central Provinces and Berar. 13
Revision of classification of Indian cotton adopted in the all-India Cotton Forecasts 13
Report on the accuracy of the all-India cotton forecasts 14
Publications 14

CHAPTER III.

Progress in the Introduction of Improved Varieties of Cotton .. .. 15—38
(i) Bombay 18
(*ii*) Sind 23
(*iii*) Punjab 26
(*iv*) Central Provinces and Berar 27
(*v*) Madras 28
(*vi*) United Provinces 34
(*vii*) Hyderabad State 35
(*viii*) Baroda State 36
(*ix*) Rajpipla State 38

CHAPTER IV.

Research .. .. 39—78
Research on Cotton Technology 39
Fundamental Research 41
Cotton Research in Provinces and States 46

PAGE

(i) *Bombay.*—

(a) Broach Cotton Breeding Scheme 46

(b) Jalgaon Cotton Breeding Scheme 47

(c) Scheme for breeding wilt-resistant cottons in Surat area .. 48

(d) Scheme for improvement of Wagad cotton at Viramgam and Jagudan 49

(e) Scheme for improvement of cotton crop in Kaira district .. 50

(f) Scheme for interspecific hybridisation in cottons at Surat .. 51

(g) Scheme for improvement of Dharwar-American cotton .. 52

(ii) *Sind.*—

(a) Scheme for production of long staple cottons in Sind 53

(b) Scheme for Cotton Jassid Investigation 54

(c) Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan 55

(d) Scheme for bollworm investigation and clean-up campaign in Sind 56

(iii) *Punjab.*—

(a) Punjab Botanical Scheme 57

(b) Scheme for improvement of Punjab-American 289 F/K. 25 cotton 59

(c) Physiological Scheme 60

(d) Cotton Jassid Investigation in the Punjab 64

(iv) *Central Provinces and Berar.*—

Central Provinces and Berar Cotton Breeding Scheme 65

(v) *Madras.*—

(a) Pempheres Scheme 66

(b) Scheme for improvement of Mungari cotton in Madras Province. 66

(c) Scheme for Improvement of Cocanadas cotton in Madras Province 68

(vi) *United Provinces.*—

United Provinces Botanical Scheme 69

(vii) *Bengal.*—

Scheme for cultivation of long staple cotton in Bengal .. 70

(viii) *Baluchistan.*—

Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan 71

(ix) *Hyderabad.*—

(a) Botanical Research Scheme 72

(b) Scheme for improvement of cotton of Oomras tract in Hyderabad State 73

(c) Scheme for improvement of Kumpta cotton 74

(x) *Baroda.*—

(a) Root Rot Scheme 75

(b) Scheme for improvement of Mathio cotton at Amreli 75

PAGE

(*xi*) *Bikaner.*—

Bengals cotton Improvement Scheme 76

(*xii*) *Mysore.*—

Mysore (*Doddahathi*) Cotton Scheme 77

CHAPTER V.

Seed Distribution and Extension Schemes .. ..79—97

Bombay.—

(*a*) Surat Seed Distribution Scheme 79

(*b*) Scheme for Selection 1A cotton 80

(*c*) Jarila Seed Distribution and Extension Scheme 81

(*d*) Deccan Canals (Jarila) Seed Distribution Scheme 82

(*e*) B. D. 8 Seed Distribution Scheme 82

(*f*) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme .. 83

(*g*) Scheme for cultivation of 1027 A. L. F. cotton in Nawapur Taluka .. 85

(*h*) Scheme for Multiplication and Distribution of 'Vijaya' cotton in Middle Gujerat 85

(*i*) Scheme for Multiplication and Distribution of 'Wagotar' cotton in Ahmedabad District 86

Sind.—

(*a*) Seed Distribution and Extension Scheme 86

(*b*) Financing of Seed Distribution 88

Central Provinces and Berar.—

(*a*) Verum Seed Distribution and Marketing Scheme 89

(*b*) Scheme for Distribution and Marketing of *Buri* 107 cotton 90

(*c*) Scheme for Distribution and Marketing of *Jarila* cotton in Central Provinces and Berar 91

Madras.—

(*a*) Co. 3 Seed Distribution Scheme 91

(*b*) Scheme for Distribution of H. 1 strain in the Westerns area 92

(*c*) Maintenance of nucleus of pure seed of improved varieties of cotton .. 93

United Provinces.—

Scheme for Distribution and Extension and Marketing of Perso-American cotton in Western United Provinces 93

Baroda State.—

(*a*) Baroda (Navsari) Seed Storage Scheme 94

(*b*) Baroda B. D. 8 Seed Distribution Scheme 95

(*c*) B. 9 Seed Storage Scheme 96

(*d*) Scheme for creation of a pure Wagad Zone in Mehsana District in Baroda State 97

PAGE

CHAPTER VI.

Cotton Marketing, Legislation and other Protective Measures .. .. .. 98—107
(*i*) Planned production of cotton 98
(*ii*) Deterioration in quality of Indian cotton crop 98
(*iii*) Cotton baling hoops 100
(*iv*) Fuel requirements of ginning and pressing factories 100
(*v*) Dismantling of cotton ginning and pressing factories 100
(*vi*) Supply of iron for agricultural purposes 101
(*vii*) Provision of improved implements, machinery and fertilisers 101
(*viii*) Regulated cotton markets 101
(*ix*) Agmarking 102
(*x*) Universal standards 102
(*xi*) (*a*) Cotton Transport Act 102
(*b*) Cotton Ginning and Pressing Factories Act 102
(*c*) Prohibition of mixing of different varieties of cotton 105
(*d*) Prevention of introduction of foreign cotton pests 107
(*e*) The Red (Sudan) Bollworm (Diperopsis castanea) and other pests. 107
(*f*) Cotton Control Acts 107

APPENDICES.

I. Balance Sheet as at 31st March, 1944; statement of receipts and payments for the year ended 31st March, 1944 108
II. Members of the Indian Central Cotton Committee 122
III. Sub-Committees 124
IV. Stock of Indian cotton on 31st January, 1944, held by the mills and the trade in Madras Province 126
V. Indian raw cotton consumed in Indian mills 127

INDIAN CENTRAL COTTON COMMITTEE. ANNUAL REPORT.

CHAPTER I.

INTRODUCTORY.

THIS is the twenty-third Annual Report of the Indian Central Cotton Committee, covering the period 1st September, 1943, to 31st August, 1944. While maintaining the general form of previous reports, it has been decided this year to limit to essential facts, the usual survey both of research and other activities of the Committee. It is hoped, however, that, in spite of condensation, the report will serve to give an adequate outline of the past year's activities. It may be mentioned that throughout the year the work of the Committee has been maintained and in some directions expanded despite increasing difficulties arising from war conditions.

There was no change in the administration. Mr. D. N. Mahta continued as the Secretary of the Committee and Dr. Nazir Ahmad as Director of the Committee's Technological Laboratory. The receipts during the year amounted to Rs. 6,33,815 and the total expenditure to Rs. 9,37,726. The receipts and expenditure of the Committee, as well as the Balance Sheet for the year as at 31st March, 1944, are given in Appendix I.

Under the Indian Cotton Cess Rules, members, who are not *ex-officio* members, hold office for three years and one-third of their number retire each year in rotation. The term of office of additional members appointed by the Governor-General under Section 4 (xi) of the Indian Cotton Cess Act is three years or such lesser period as may be specified in the notification. A list of the members constituting the Committee and the various interests they represent as on 31st August, 1944, is given in Appendix II. The composition of the Sub-Committees as on 31st August, 1944, is given in Appendix III. The functions of the various Sub-Committees have been detailed in previous Annual Reports, and it is not proposed to repeat them here.

Sir Pheroze Kharegat (President), Sir Chunilal B. Mehta (Vice-President), Mr. W. J. Jenkins, Sir Chunilal V. Mehta and Mr. D. N. Mahta, Secretary, represented the Committee on the Board of Governors of the Institute of

Plant Industry, Indore, during the financial year ending 31st March, 1944. Mr. Roger Thomas represented the Committee on the Imperial Council of Agricultural Research. Under Article 51, as amended, of the Articles of Association of the East India Cotton Association, the Committee is entitled to nominate, from amongst its growers' representatives, three persons, whether members of the Association or not, not having dealings in forward contracts, as Directors of the Association. Rao Bahadur Sir Madhaorao Deshpande, Mr. L. Madhava Reddi and Mr. S. T. More were elected by the Committee as its representatives for the cotton year 1943-44.

To ensure that the requirements of the cotton textile industry are (*a*) given due weight in the allocation of transport facilities, but (*b*) not so handled as to embarrass Provincial Governments, Regional Transport Authorities and Railway Administrations in dealing with the general transport problem, the Government of India established a Cotton Movements Panel (afterwards changed to the Cotton Movements Committee) in Bombay with effect from September, 1942. Sir Chunilal B. Mehta, Vice-President, was appointed as the Committee's representative on the Panel. The Government of India also appointed Mr. D. N. Mahta, Secretary, as a member of the Panel. In November, 1942, the Cotton Movements Control Order was notified.

Two meetings of the Central Cotton Committee were held in the year that has lapsed since the last report was issued. At the first meeting, which was held at Bombay on the 28th and 29th January, 1944, His Excellency Sir John Colville, Governor of Bombay, was present. Sir Pheroze Kharegat presided. The Committee was mainly concerned with the important questions of the floor and ceiling prices of cotton fixed by the Government of India and the urgency of prohibiting the mixing of cottons in India. After a lengthy discussion it was decided that the Government of India should be informed that whilst the Indian Central Cotton Committee was thankful to them for the action taken by them in fixing a minimum price for cotton, it was of the opinion that the floors fixed should be definite and not hampered by conditions and limitations which had so far prevented them from acting as proper floors; further, that the conditions laid down by Government in their press communiqué to the effect that they would not buy any cotton unless the Indian Cotton Contract in the market of the East India Cotton Association in Bombay was quoted at the floor price of Rs. 400 and that then Government would buy basic *Jarila* Khandesh $\frac{3}{4}$" staple at the floor price

of Rs. 400 per *candy* and other styles at the floor prices announced or at the market rates for these styles, whichever was lower virtually, rendered the floor prices fixed for varieties other than *Jarila* ineffective in practice. It was suggested that it might be mentioned as an instance that, in accordance with the communiqué referred to, it would seem that even if Sind N. T. (for which the floor price fixed is Rs. 575) were selling at Rs. 500 or less Government would not buy such cotton so long as *Jarila* was quoted at or above Rs. 400 and that the feeling of the Committee was that, to ensure greater degree of price stabilisation, there should be effective floors for different varieties unhampered by any conditions and that Government should declare their readiness to enter the market to buy at the floor levels notified when the rates were, say, within 5% above the floor prices fixed. It was decided further that Government should be requested to make it clear that the floor and ceiling prices fixed referred to the average quality roller-ginned cotton of the respective styles for the season concerned, that the lower qualities offered shall be bought at fair discounts and that saw-ginned styles shall be bought at fair premiums *pro rata* with the respective floors announced for roller-ginned styles. The view was also expressed that it should be suggested to Government that suitable provision should be made for arbitration in case of disputes arising from fixation of prices. As regards the floor price of Rs. 400 per *candy* fixed for *Jarila* $\frac{3}{4}$" staple, it was decided that Government should be informed that in the opinion of the Committee this was too low, having regard to the fact that, owing to the war, the cost of all articles required by the cotton growers had recently greatly increased with consequent rise in the cost of production of cotton, and that the general opinion of the Committee was in favour of the minimum being raised to Rs. 500 per *candy*. It was decided further that it should be pointed out to Government that at the current price of cloth a floor price of Rs. 500 for *Jarila* $\frac{3}{4}$" staple was not in any way unreasonable, but that, if the suggestion for putting up the floor prices was considered contrary to the general anti-inflationary policy of Government, steps should be taken to reduce the price of cloth to a suitable level so as to remove the present disparity between the price of cotton and that of cloth.

As regards the second point, *viz.*, urgency of prohibiting mixing of cottons in India, the following resolution was unanimously passed :—

> "In the opinion of this Committee resolute and determined steps should be taken at once effectively to stop the malpractice of mixing of cottons. The Committee accordingly authorises the local Sub-Committee to go into the matter, take such action as it can and put up its final proposals for confirmation at the next monsoon meeting of the full Committee."

The second meeting of the year was held in July, 1944, at Bombay; Mr. H. R. Stewart, C.I.E., Officiating Vice-Chairman of the Imperial Council of Agricultural Research, presided. The principal subjects considered at this meeting were the ceiling prices of cotton, the necessity of eradicating the malpractice of mixing different varieties of cotton and the urgency of growing more food crops. On these subjects the following resolutions were passed :—

1. "The Indian Central Cotton Committee, while taking full cognizance of the gravity of the food situation in the country and of the urgent necessity of increasing the supply of food grains, is unanimously of the opinion that the lowering of floor and ceiling prices for cotton will not achieve the object in view but will only result in severe hardship to the cotton cultivators and seriously interfere with the economic conditions of the rural population as a whole.

The Committee considers that the solution of the food shortage problem lies along the avenue of planned production and not in reducing the income of growers of non-food crops to a bare subsistence. To aim at price levels for cotton, which will leave the growers only a bare subsistence, is a retrograde step which will greatly add to the difficulties of post-war nation building.

It is the considered view of the Committee that the shortage of foodstuffs can best be met by the enforcement of legislation restricting the area under cotton in accordance with a co-ordinated policy of planned production on an all-India basis, without unnecessarily reducing the purchasing power and the already low standard of living of cotton growers.

The Committee is of the opinion that the floor and ceiling prices for the 1944-45 season, announced by Government in their press note dated the 15th July, 1944, are very low. It, therefore, strongly recommends that the fixed floor prices for *Jarila* and all other styles should be raised by at least Rs. 50. In making this recommendation, the Committee has given due regard to the present increased cost of producing cotton, arising more especially out of the heavy increased cost of consumers' goods, labour, agricultural implements, plough-cattle, etc."

2. "The Indian Central Cotton Committee is convinced that the malpractice of mixing of different varieties of cotton is seriously hampering the work of cotton improvement in the country. It is the considered view of the Committee that until this malpractice is made a penal offence, it will be impossible to provide seed of improved varieties of cotton in quantities adequate to meet requirements. In the interests of Indian cotton as a whole, therefore, the Committee is unanimously of the opinion that, as a first step, the mixing of short staple with medium and long staple cotton and of medium with long staple cotton at the factories should be forthwith prohibited by the Government of India, by legislation. The Committee further recommends that steps be taken by the Government of India to ensure that the legislation is put into effect by the Provincial and State Governments as soon as possible and, in any case, well in advance of the cotton season commencing 1st

September, 1945. The Committee has no doubt that the adoption of the measure suggested by it will have a beneficial effect on the food position of the country for, if the utilisation of short staple cotton for mixing purposes is stopped, the production of such cotton would be automatically reduced to the minimum commensurate with requirements."

3. "In view of the paramount importance and urgency of growing more food during the present emergency and in the interests of improvement of Indian cotton in future so as to make its production remunerative to the grower, the Committee is strongly of the opinion that concerted efforts should be made to develop the agricultural resources of the country to the fullest extent possible. The Committee is convinced that the object in view can be achieved by improved methods of farming, suitable rotation of crops, and, above all, where conditions are favourable, by the introduction of mechanical devices for cultural and harvesting operations. It accordingly requests the Government of India to give immediate facilities for manufacture in the country and import from abroad (to meet immediate requirements) of improved implements and machinery and fertilisers."

Despite war conditions, research and other activities of the Committee continued unhampered and good progress was recorded in each branch. A brief account of the work done and the results achieved during the period under review is given in the following chapters.

CHAPTER II.

COTTON STATISTICS.

The total area under cotton in India during the year under review was 20,398,000 acres, showing an increase of 1,195,000 acres as compared with the previous year. The increase was mainly in the Punjab, Sind and the United Provinces and the States of Hyderabad, Gwalior and Rajputana. The acreage in the Provinces of Bombay, Madras and Central Provinces and Berar recorded a decrease. The total estimated outturn for 1943-44 was 50,94,000 bales, against 47,02,000 bales in 1942-43.

INDIAN COTTON SITUATION—1943-44.

The firm undertone with which the market closed during the end of the previous season continued through the opening month of the season under review which witnessed a further improvement in prices. The first All-India Cotton Forecast, 1943-44, showed a reduction of 4 per cent in the acreage as compared with the corresponding forecast for the previous year ; there was, however, an increase in the acreage under long staple cotton. In October 1943, the Government of India permitted, subject to certain safeguards, the re-opening of the cotton futures market as an experimental measure ; the chief restriction related to the limits within which trading could be carried out, the maximum and minimum limits being fixed at Rs. 550 and Rs. 400 per candy, Bombay delivery, respectively, in terms of the Indian Cotton Contract. Government, however, retained the right to requisition cotton for the use of mills at prices from about 3 to 5 per cent below the ceiling prices, if cotton prices touched the ceilings. Forward trading was to be confined to the official market which existed in Bombay only. Members of the East India Cotton Association, Bombay, who intended to enter into forward contracts were required on each clearing day commencing from the 12th November, 1943, to deposit with the said Association, which should in turn deposit with the Imperial Bank of India a sum, not carrying interest, which should be not less than Rs. 25 per bale on the net open futures position of each such member, regardless of the price of such contract. Trading in options continued to be prohibited. The second All-India Cotton Forecast, 1943-44, showed a decrease of 8 per cent in the acreage as compared with the corresponding figures for last year. There was better buying support for spot cotton in the Bombay market throughout the month of October, mills evincing keen interest in

staple styles. At the end of October, *Jarila* ($\frac{3}{4}$" staple) was quoted at Rs. 440 per candy. After an initial rise, cotton prices tended to be marked down for the greater part of November, due to absence of buying support and increased arrivals in up-country markets. On the 18th November, 1943, the Government of India issued a press communiqué announcing the fixation of 'floor and ceiling' prices for certain descriptions of cotton and the means by which it was intended to maintain the price of Indian cotton between the floor of Rs. 400 per candy and the ceiling of Rs. 550 per candy in terms of the Indian Cotton Contract. Following this announcement the market firmed up and the quotation for Indian Cotton Contract, January delivery, gradually advanced to Rs. 458/4 on November 30 from Rs. 435/8 on November 18. The upward trend of prices was well maintained during the following month due to good enquiries for staple styles. The Indian Cotton Contract, January delivery, opened at Rs. 456 on the 1st December and closed at Rs. 480 on the 31st December. The Third All-India Cotton Forecast for 1943-44 recorded a decrease of 2 per cent in the acreage but an increase of 6 per cent in the yield as compared with the corresponding revised figures for last year. The Bombay cotton market displayed on the whole a quiet tendency during January and February 1944. The Indian Cotton Contract, which opened at Rs. 478 on the 3rd January, gradually declined to Rs. 467 on the 27th January but later rose by about 10 points on improved mill demand and the resumption of hedge business in the Karachi market. Thereafter, factors such as heavy crop movement, indifferent demand in the ready market, bearish sentiment of the cloth and yarn markets and fear of heavy tenders against March delivery had a bearish effect on the trend of prices. The rate stood at Rs. 455 on the 29th February. The market continued to be weak during March. *Jarila* May which opened at Rs. 455/8 on 1st March declined to Rs. 434/8 at the close of business on 31st March. Raw cotton prices continued their downward course, due to poor demand and the accumulation of heavy stocks in upcountry markets. Occasional Government purchases were the only steadying influence but that too proved inadequate in view of the continued absence of mill buying. The quotation for *Jarila* May delivery declined from Rs. 438 in the first week of April to Rs. 414 by the middle of May but slightly improved before the settlement date. The All-India Final Cotton Forecast, 1943-44, revealed an increase of 6 per cent in area and 8 per cent in yield as compared with the previous year. The position of cotton deteriorated further in June and July 1944, the chief factors which influenced prices being the lack of confidence on account of the complete absence of demand and the over-abundance of supplies of unwanted cotton. Government purchases, when the price tended to touch the floor had, however,

a steadying effect. *Jarila* July lost ground rapidly from Rs. 426 at the beginning of June to Rs. 409 by the middle of that month. After declining further, it gradually improved to Rs. 410-8-0 on the 5th July but again went down. Towards the end of July, prices recovered temporarily on developments in the war situation, with *Jarila* September quoting at Rs. 413-12-0 against Rs. 424 on the 22nd July and Rs. 440 at the beginning of June. Except for occasional minor recoveries, the trend of prices during the month of August was downward. General support was lacking in the absence of new crop trading facilities. September *Jarila* which was quoted around Rs. 415 at the beginning of August reached the floor by the end of the month.

As regards the statistical position of Indian cotton, the season started with an estimated carry-over of 26.0 lakhs bales (400 lbs. net each) with the trade (excluding spinning mills). On the basis of the figures of cotton pressed and unpressed cotton consumed in mills, the actual crop in 1943-44 is estimated to be about 53.0 lakhs bales (excluding extra-factory consumption of 4.5 lakhs bales), of which 35.5 lakhs bales are estimated to have been of staple length $\frac{7}{8}''$ and above. The receipts at mills of Indian cotton on the basis of voluntary returns amounted to 41.0 lakhs bales (400 lbs. net each), of which 29.3 lakhs bales were of staple length $\frac{7}{8}''$ and above. The total exports during the season amounted to 3.6 lakhs bales, of which 2.1 lakhs bales were of staple length $\frac{7}{8}''$ and above.

On the basis of the figures of actual production, mill receipts and exports, the carry-over of Indian cotton with the trade, excluding spinning mills, at the end of the season, is estimated at 34.4 lakhs bales as shown below :—

	In lakhs of bales of 400 lbs. net (excludes extra-factory consumption).		
	Total.	$\frac{7}{8}''$ and above.	Below $\frac{7}{8}''$.
Estimated stocks held by the trade (excluding spinning mills) on 31st August, 1943	26.0	7.0	19.0
Probable production in 1943-44	53.0	35.5	17.5
Total supply ..	79.0	42.5	36.5
Estimated receipts at mills in 1943-44	41.0	29.3	11.7
Exports during 1943-44	3.6	2.1	1.5
Total distribution ..	44.6	31.4	13.2
Estimated stocks held by the trade on 31st August, 1944	34.4	11.1	23.3

REPORT ON THE STAPLE LENGTH OF INDIAN COTTON CROP.

A report on the estimated production of cotton according to staple length for the 1943-44 season was issued in August 1944, the trade estimates of the crop were also presented in this report. Of the official revised estimate of 5,094,000 bales (compared with the trade estimate of 5,530,000 bales), 12% was of staple length 1″ and above and 49% of staple $\frac{7}{8}$″ to 31/32″. It was reported last year that the Committee decided that a Special Sub-Committee consisting of representatives of the East India and the Karachi Cotton Associations, the Southern India Millowners' Association and the Indian Central Cotton Committee should be appointed to go into the question of the existing staple length groups adopted in Statistical Leaflet No. 1 issued by this office and the classification of Indian cotton under these groups, in the light of the experience gained during the last six or seven years and the changes that have taken place in the character of the Indian cotton crop. After consulting the Associations referred to above, the Committee at its meeting in July 1944 appointed the following to constitute the Special Sub-Committee :—

Indian Central Cotton Committee ..	6 representatives (the Vice-President, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Mr. A. P. Darlow, Dr. Nazir Ahmad and the Secretary.
East India Cotton Association ..	4 representatives (Mr. Haridas Madhavdas, Mr. Hansraj Jivandas, Mr. Ramdas Kilachand and Mr. Jehangir P. Patel).
Karachi Cotton Association	1 representative.
Southern India Millowners' Association.	1 representative (Mr. K. Devarajulu Naidu).

DEMAND FOR VARIOUS TYPES OF INDIAN COTTON.

As usual, statistics relating to internal and export demand for various types of Indian cotton were compiled from information furnished on a voluntary basis and published in Statistical Leaflets Nos. 3 and 4 (1943-44). It is hardly necessary to emphasise the importance of these statistics to the trade and industry as well as to those entrusted with the responsibility of shaping and directing the cotton policy of the country. Receipts at mills of Indian cotton, during the season, were lower than those of the previous year by 217,000 bales, while exports were higher by 2.2 lakhs bales. Mill receipts of Indian cotton of staple length "$\frac{7}{8}$ inch and above" rose by 37,000 bales

during the year, the offtake of short staple cotton (below $\frac{7}{8}$") being lower by nearly 2.5 lakhs bales as compared with the previous year. "Long and medium staple" and "short staple" cottons formed 57 and 43 per cent, respectively, of the total exports during the season, as compared with 44 and 56 per cent in the previous year.

STOCKS.

The information collected in respect of stocks of cotton held in the country on the 31st August, 1944, was published in Statistical Leaflet No. 2 (1943-44). Trade associations, market committees and other authorities gave valuable assistance in the collection of figures of stocks of cotton held in the country at the end of the season. Stocks of Indian cotton held in India by the trade at the end of the season 1943-44 on the basis of voluntary returns, amounted to 28.3 lakhs bales, showing an increase of 10.4 lakhs bales on the previous year. The scope of the census of stocks of cotton held by the trade was extended during the year under report but the figures still do not cover certain areas, while the information collected for some other areas remains incomplete. On the basis of the figures of actual crop, exports, mill receipts, etc., the carry-over of cotton held by the trade on the same date is estimated at some 35.1 lakhs bales; one important cotton firm estimates the stocks at 40.7 lakhs bales. With a view to making the trade stocks figures as complete as possible, the Provincial Governments have been requested to introduce legislation providing for the collection of the required information on a compulsory basis.

As the season adopted for the cotton crop of the Madras Province is the year ending 31st January, figures of stocks of cotton held in the province on this date are collected annually in addition to the figures relating to the 31st August. The relevant figures for the 31st January, 1944, together with comparative details for previous years, are given in Appendix IV.

INDIAN MILL CONSUMPTION.

Figures of consumption of Indian cotton in mills in British India and Indian States for the years 1929-30 to 1943-44 based on the monthly statements issued by the Committee, are given in Appendix V. The total consumption of Indian cotton in mills in India during the season under report, *viz.*, 41,19,461 bales, showed a decrease of 1,87,370 bales as compared with the previous season. With the exception of Bengal and Punjab and Delhi,

all other provinces recorded decreased consumption. Out of the total reduction of 1,87,370 bales, Indian States accounted for about 28%.

EXPORTS.

The exports of Indian cotton from British India during the season totalled 3,62,000 bales against 1,55,000 bales in 1942-43. On the average of the three financial years ending 1943-44, the value of cotton (including waste) exported from British India formed 20% of the total value of export of " Raw materials and produce and articles mainly unmanufactured " and 5% of the total value of all merchandise exported.

STATISTICS OF COTTON PRESSED.

During the season under review, 33,56,098 bales of cotton were pressed in British India and 15,97,924 bales in Indian States, making a total of 49,54,022 bales for all-India; the corresponding figures for 1942-43 were 30,21,287, 12,11,344 and 42,33,631 bales, respectively. For India as a whole, the average net weight per bale of cotton pressed during the season under report amounted to 392 lbs., against 391 lbs. in the previous season.

UNPRESSED (LOOSE) COTTON STATISTICS.

The statistics of cotton pressed do not account for the whole of the Indian cotton crop as, apart from the quantity utilised for extra-factory consumption, chiefly in the form of *kapas*, mills situated in cotton growing areas often use considerable quantities of ginned, unpressed cotton. During the year, 3,72,416 bales of unpressed cotton were consumed in mills in India against 4,60,868 bales during the preceding year. The relevant figures for the years 1929-30 to 1943-44 are given in Appendix V to this report.

STATISTICS OF COTTON GINNED.

The figures of cotton pressed do not cover the entire crop as, apart from ginned unpressed cotton consumed in spinning mills for which figures are available, both ginned unpressed cotton and *kapas* are also utilised for domestic purposes, such as, hand-spinning, making of quilts, mattresses, etc., for which there are no reliable data. If, however, ginning returns could be instituted, all that would be necessary for arriving at the actual crop would be to estimate the quantity of *kapas* used for domestic purposes. The ginning and pressing returns would at the same time serve as a check on each other. The submission of ginning returns is now in force in the Central Provinces and Berar, Bombay Province, Bengal, Sind, the United Provinces and Ajmer-

Merwara and certain Indian States. The Committee approved, during the year under report, the draft form of return proposed to be submitted by ginning factories in the Madras Province and the list of varieties for which information is to be obtained. As the Punjab is the only important cotton growing province other than Madras that has not yet instituted ginning returns, the Punjab Government has been requested to take early steps to implement the recommendation of the Committee in the matter by availing of the provisions of Section 5A of the Cotton Ginning and Pressing Factories (Amendment) Act, 1942, passed by the Government of India. The desirability of collecting information regarding the variety of cotton ginned has been stressed and to begin with the Provincial Government has been requested to collect the figures under two heads, *viz.*, "Punjab *desi*" and "Punjab-American."

IMPROVEMENT OF COTTON FORECASTS.

The all-India cotton forecasts of the 1942-43 season were, as usual, subjected to a post-mortem examination by the Cotton Forecast Sub-Committee of the Indian Central Cotton Committee, at the close of the season, with a view to detecting sources of errors and suggesting remedial measures. The actual crop for all-India during 1942-43 was estimated at 49.6 lakhs bales against 45,54,000 bales forecasted in April 1943. The discrepancy lay mainly in the forecast estimates of the Punjab, Sind, Bombay and Madras Provinces. It was also observed that in regard to the Nizam's territory the forecast was an over-estimate by about 21% of the actual. In accordance with the decision of the Committee, the attention of the forecasting authorities in the Provinces and States was drawn, where necessary, to the discrepancies between the forecasts and the estimated actual crop.

The need for an up-to-date publication explaining the procedure followed in the preparation of official cotton forecasts has often times been stressed at the meetings of the Committee and recently it was decided that a note on the subject should be compiled and published for general information. A Manual on the preparation of all-India cotton crop forecasts was accordingly issued during the year under report.

As in the past, the estimates of the cotton crop were received by wire from the Department of Commercial Intelligence and Statistics and released in Bombay at a time previously fixed to synchronise with the time of their release in Calcutta.

SCHEME FOR CROP ESTIMATING SURVEY ON COTTON IN THE CENTRAL PROVINCES AND BERAR.

The object of this scheme is to provide a suitable technique for conducting crop-cutting experiments on cotton which form the most reliable direct basis for estimation of yield. The scheme was originally sanctioned by the Committee in July 1942 for a period of one year. It came into operation on the 15th October, 1942, the venue of experiments being the Akola district. At its meeting in July 1943, the Committee agreed to extend the scheme to the Buldana district for a period of one year. Crop-cutting experiments were accordingly carried out during the year under report in the Akola and Buldana districts for estimating the yield of cotton in the two districts. Side by side, arrangements were made to ascertain, by executive enquiries, the movement of loose cotton in and out of these two districts so that this information together with the statistics of cotton pressed already available could be used as an independent check on the result of the crop-cutting experiments. The reliability of yield estimates obtained from the crop-cutting scheme was borne out by a comparison with the results obtained from the executive enquiries.

In July 1944, the Committee approved of the proposals received from the Director of Land Records, Central Provinces and Berar, for extending the scheme to the whole cotton tract of the Province for a period of one year in the first instance. The object is to determine accurately the yield of *kapas* per acre and the total production for the whole of the cotton area in the Province, by the method of harvesting random plots. The experiments will be carried out in 204 villages selected at random from various cotton-growing *tahsils* of the Province, the average being six villages per *tahsil*. In each selected village, four random fields having a plot 33′ in breadth and 132′ in length will be taken for carrying out the experiments.

It is at the same time also intended to train the staff of the Land Records and Agricultural Departments in the practical working of the method so that the work could ultimately be taken over by these departments as a routine procedure for carrying out crop-cutting experiments.

REVISION OF CLASSIFICATION OF INDIAN COTTON ADOPTED IN THE ALL-INDIA COTTON FORECASTS.

The Committee considered certain suggestions for modifying the classification of Indian cotton used in the all-India cotton forecasts and decided that a draft scheme of classification, taking into account the changes effected in the different varieties of cotton produced in the various tracts during the

last few years, should be drawn up and placed before the Committee. It was further decided that a cotton map showing the proposed varietal classification should be prepared.

REPORT ON THE ACCURACY OF THE ALL-INDIA COTTON FORECASTS.

The publication of Statistical Leaflet No. 5 entitled "Report on the accuracy of the all-India cotton forecasts" has been suspended for the duration of the war, commencing with the issue for the 1941-42 season.

PUBLICATIONS.

The undermentioned statistical publications were issued during the year under report :—

(1) *Statistical Leaflet No. 2.*—Tenth Issue (1942-43), "Stocks of Indian raw cotton held in India by the mills and the trade on 31st August, 1943."

(2) *Statistical Leaflet No. 3.*—Tenth Issue (1942-43), "Receipts at mills in India of raw cotton classified by varieties—1942-43 season."

(3) *Statistical Leaflet No. 4.*—Tenth Issue (1942-43), "Exports by sea of Indian raw cotton classified by varieties—1942-43 season."

(4) *Statistical Leaflet No. 1.*—Eleventh Issue (1943-44), "Report on the staple length of the Indian cotton crop of 1943-44 season."

(5) *Statistical Bulletin No. 12*—"Supply and Distribution of the Various Types of Indian Cotton during the 1941-42 season."

(6) A Manual on the preparation of All-India Cotton Forecasts.

CHAPTER III.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON.

The year under review witnessed further progress in the spread of improved varieties which covered 9,897,000 acres or 48% of the total cotton area, as compared with 10,382,000 acres or 54% of the total in the previous year. In accordance with the policy of increasing the production of better staple cottons, the improved varieties disseminated have been mostly of medium and long staple. The introduction and extension of superior varieties of cotton has contributed to raise the average staple of the Indian cotton crop as will be seen from the following table in which an attempt has been made to classify the Indian cotton crop according to varieties and staple lengths.

(Quantities are in thousand bales* of 400 lbs. each.)

Description of cotton.	Average 1922-27	Average 1938-43	1943-44.	% increase (+) or decrease (—) of col. 4 over col. 2.
1	2	3	4	5
Short staple—below $\frac{7}{8}$".—				
(1) Bengals	905	943	627	
(2) Oomras	1,890	1,051	439	
(3) Central India	324	260	291	
(4) Broach (Part)	65	227	84	
(5) Dholleras	525	309	278	
(6) Kumpta and Upland (Part) ..	(*a*)	38	56	
(7) Bijapur and Bagalkot Jowari.	(*b*)	143	..	
(8) Westerns (Part)			87	
(9) Warangal and Cocanadas ..	49	32	32	
(10) Salems	30	6	8	
(11) Chinnapathi	39	44	1	
(12) Comillas			35	
Total Short staple — Quantity	3,827	3,053	1,938	—49
Total Short staple — % on "Total-All Staples."	70	57	38	

* Statistical bales containing 400 lbs. of cleaned (lint) cotton.

(*a*) Included under item (19) separate figures not being available.

(*b*) „ „ „ (20) „ „ „

Description of cotton.	Average 1922-27	Average 1938-43	1943-44.	%increase (+) or decrease (—) of col. 4 over col. 2.
1	2	3	4	5
Medium & Long staple—$\frac{7}{8}$" & above.—				
(13) Americans—Punjab and Sind (staple, 1" and above)* ..	..	276	587	
(14) Americans—Punjab and Sind (staple below 1")	264	926	889	
(15) C. P. and Berar Verum ..	..	76	113	
(16) Hyderabad Gaorani	332	140	156	
(17) Broach (Part)	214	11	141	
(18) Surti		150	130	
(19) Kumpta and Upland (Part) .	259	178	140	
(20) Westerns (Part)	251	58	53	
(21) White and Red Northerns ..			18	
(22) Tinnevellies (including Karungannies)	155	151	130	
(23) Cambodias	147	194	235	
(24) Jarila	..	152	484	
(25) Buri	..	28	80	
Total—Medium & Long staple. Quantity	1,622	2,340	3,156	+95
Total—Medium & Long staple. % on "Total—All Staples"	30	43	62	
TOTAL—All Staples ..	5,449	5,393	5,094	—7

* Includes 'Punjab-American 289F/K.25' Sind Sudhar (Sind-American 289F-1) and 'Punjab-American 289F/43', and Sind-American—M4.

It will be seen that the proportion of cotton of staple length $\frac{7}{8}$" and above to the total production increased from 30% in the quinquennium 1922-27 to 43% in the quinquennium 1938-43; the proportion in 1943-44 was 62% against 60% in 1942-43. The production of 'medium and long staple' cotton in 1943-44 increased by 1,534,000 bales or 95% as compared with 1922-27; under "short staple" there was a reduction of 1,889,000 bales or 49%. The production of cotton of staple length '1" and above,' which was *nil* in 1922-27, amounted to 654,000 bales in 1943-44.

In tackling the question of improving the quality of Indian cotton, the importance of raising the yield per acre has not been overlooked. A notable increase has already been achieved as will be evident from the following table, in which two sets of figures of yield, one based on the official crop forecasts

and the other on the figures of actual crop accounted for by mill consumption, exports and extra-factory consumption, are given :—

Year (1st Sept.—31st Aug.)	Area (Thousand acres.)	Production Government estimates (Thousand bales of 400 lbs. each.)	Yield per acre (lbs.) Col. 3 / Col. 2.	Approximate (commercial) crop (Thousand bales of 400 lbs. each.)	Yield per acre calculated from approximate (commercial) crop. (lbs.) Col. 5. / Col. 2.
1	2	3	4	5	6
Average 1922–27	24,723	5,449	87	*5,954	96
,, 1927–32	24,738	5,206	84	*5,851	95
,, 1932–37	23,912	5,315	89	*6,447	108
1937–38	25,746	5,737	89	† 6,370	99
1938–39	23,490	5,051	86	† 6,051	103
1939–40	21,580	4,909	91	† 5,884	109
1940–41	23,311	6,080	104	† 7,032	121
1941–42	24,151	6,223	103	† 6,949	115
Average 1937–42	23,656	5,600	95	† 6,457	109
,, 1942–43	19,203	4,702	98	† 4,961	103
1943–44	20,398	5,094	100	5,723	112

* Calculated from mill consumption (*a*) † exports (*b*) † extra-factory consumption (*c*). Variation in stocks has not, however, been taken into account.

(*a*) Mill consumption in Burma included up to 31st March, 1937.

(*b*) Includes exports from Burma up to 1934-35.

(*c*) The new figure for extra-factory consumption, *viz.*, 450,000 bales for the whole of India, based on enquiries conducted by the Committee, in selected areas, has been used throughout.

† Best estimate of the crop as arrived at by the Indian Central Cotton Committee in connection with the annual post-mortem examination of all-India cotton forecasts.

From the second set of figures given in column 6, it will be seen that the average yield per acre rose from 96 lbs. in the quinquennium 1922-27 to 109 lbs. in the quinquennium 1937-42. The average yield in 1943-44 was 112 lbs. per acre against 103 lbs. in 1942-43.

The main criterion in a general policy of cotton improvement in India must be the return to the grower from the varieties recommended for cultivation by the Provincial and State Departments of Agriculture. This criterion has always been upheld by the Committee as of primary importance. Although exact data regarding the total additional benefit derived by the cultivators by growing improved types of cotton are not available, there is little doubt that the gain has been considerable. In 1943-44 according to the figures furnished by the Provincial and State Departments of Agriculture, the gross extra income realised by the grower of certain improved varieties of cotton, covering an area of 16.0 lakhs acres, amounted to about two crores of rupees. This works out to Rs. 12/8 per acre on the average, and on this basis, the total increased income, accrued to the cultivators in 1943-44, by

growing improved cottons on an area of 9,897,000 acres, may be estimated at about 12.37 crores of rupees.

The progress made in the introduction of improved varieties of cotton in the various provinces and States of India as a result of the joint efforts of the Indian Central Cotton Committee and the Provincial and State Departments of Agriculture is summarised in the following paragraphs.

BOMBAY.

Broach tract.—During the year, the Agricultural Department controlled 25,084 acres, of pure 1027 A.L.F. and 15,131 acres of "Suyog" for seed multiplication including 752 acres grown with Farm Pedigree 1027 A.L.F. and 199 acres grown with Farm Pedigree Suyog respectively.

The Department purchased in all 10,14,231 lbs. 1027 A.L.F. seed of which 11,704 lbs. were the produce of the Surat Farm. The above stock was distributed in the District through the depôts in the interior and 3,23,257 lbs. were supplied to Rajpipla State and others. 2,00,132 lbs. were distributed directly to growers by the Hansot, Panoli, Nana-Varachha societies and Nawapur Taluka Development Association. Thus the total quantity of 1027 A.L.F. handled by the Department was 12,14,363 lbs.

The Department also purchased 84,633 lbs. Suyog seed, of which 6,214 lbs. were the produce of Surat Farm. A further quantity of 16,99,32 lbs. was also directly supplied by Sonsek Co-operative Cotton Sale Society to different Co-operative Societies. Thus the total quantity of Suyog seed handled by the Department was 2,54,565 lbs.

The amended Cotton Transport Act of 1923 restricting the transport of seed cotton and cotton seed from north of River Tapti into Surat area remained in force during the year.

The Bombay Cotton Control Act of 1935 was repealed and the Bombay Cotton Control Act of 1942 was passed for regulation and prohibition of the cultivation of any variety of cotton, of the mixing of the prohibited variety of cotton with any other cotton and of the possession or use of, or trade in, the prohibited variety of cotton in any part of the province of Bombay.

Under the Scheme for Grading and Marking of 1027 A.L.F. and Suyog cottons (under the Grading and Marking Act of 1937) in Surat tract, 8,114 bales of 1027 A.L.F. and 6,316 bales of Suyog were agmarked, out of which 6,771 bales of 1027 A.L.F. and 4,857 bales of Suyog were sold at premiums

varying from Rs. 6 to Rs. 26 over local for 1027 A.L.F. and Rs. 4-8 to Rs. 25 for Suyog, respectively, leaving a balance of 1,343 bales of 1027 A.L.F. and 1,459 bales Suyog. There is no improvement in the marketing of agmark 1027 A.L.F. of guaranteed purity of 97% and above when compared to last season, while in case of Suyog Agmark certified it was satisfactory and remunerative on account of its high ginning.

In 1943-44 (this being the first year of the scheme) the Agricultural Department controlled 15,257 acres of pure Vijaya cotton for seed multiplication which included 571 acres grown with Farm Pedigree seed from Broach Farm and the Registered seed growers.

The Department stocked with the Nabipur Amod, Kisnad and Samin Societies 12,36,700 lbs. of Vijaya cotton seed, which was distributed in the interior. Besides 4,076 lbs. collected from the Broach Farm and the Registered seed growers, were subsequently distributed from different centres for further multiplication. In addition, 87,000 lbs. were supplied to Baria and Baroda States by the said Societies. Thus the total quantity of seed handled by the Department was 13,28,376 lbs.

Wagad tract.—The total area under Wagotar cotton was 772 acres during 1943-44. The whole of this area was controlled by the Department. 91 acres out of the above area were grown with pedigree seed of Cotton Breeding Station, Viramgam, and Registered Seed Growers. The total quantity of improved seed distributed was 6,068 lbs. mainly in Viramgam, Sanand, Dholka and Dhandhuka talukas. The regular scheme for spread of this variety has been started from 1-12-1943.

Khandesh—Jarila :—Jarila cotton which has been introduced for general cultivation in Khandesh is superior to local or *Banilla* in staple and is highly wilt-resistant. Its yield and ginning outturn are equal to those of the local type. It is suited to conditions in Khandesh and is appreciated both by the cultivator and the trade. The year under report is the seventh year of the Scheme financed jointly by the Indian Central Cotton Committee and the Government of Bombay, for multiplication and distribution of the seed of this variety. During the year 1943-44, 12,54,370 lbs. of *Jarila* cotton seed stocked by the Department and 53,02,570 lbs. of seed stocked by 40 approved stockists who are mostly Co-operative Organizations were distributed in the Division, the area covered being 3,80,000 acres. Out of this, an area of 1,04,463 acres under stages III, IV and V, was organized for multiplication.

In addition an area of 147 acres was grown under this variety on Jalgaon and Mamurabad Seed Farms (near Jalgaon Farm) under stages I and II.

The total area under *Jarila* including natural spread, is estimated at about 8,38,548 acres, out of the total area of 8,62,637 acres in this division, *i.e.*, about 97% of the *Oomra* area. During the year 1944-45 it is estimated that no other cotton will be grown in *Oomras* tract in Khandesh. Out of the pure seed produced on Government Farms and on the controlled areas 82,65,270 lbs. of *Jarila* seed have been stocked by the Department, Co-operative Banks, Societies and Taluka Development Associations, for distribution during the season of 1944-45. The production of *Jarila* including natural spread is estimated at 2 lakhs of bales or approximately 93 lbs. of lint per acre on an average.

During the year 1943-44 there were heavy rains towards the middle of October. These rains affected the cotton crop adversely as regards its yield and quality. The proportion of immature bolls (*kavdis*) and yellow stains was greater and as a result the Khandesh *Jarila* was quoted at Rs. 50 to Rs. 60 off at the Bombay Market. During the marketing season the demand for cotton on account of the above defects as well as difficulties of transport was slack. Owing also to the Bombay Growth of Food Crops Act, 1944, and to better rates and demand for groundnuts, the demand for *Jarila* cotton seed was somewhat restricted. The premium for *kapas* and lint continued to be high as compared to that of local as before.

A notable feature of the year is the application of the Cotton Control Act to the East Khandesh District. Arrangements are also in progress to apply it to the West Khandesh District (excluding talukas of Nandurbar and Taloda and Nawapur Peta) and to the talukas of Malegon, Nandgaon, Baglan, Kalwan and Yeola of the Nasik District. The provisions of the amended Ginning and Pressing Factories Act, 1925, have fairly assisted in prohibiting mixing in ginning and pressing factories.

As mentioned in the last year's Report there are now 16 Co-operative Cotton Sale Societies for marketing and agmarking pure *Jarila* cotton in the Division. The work of agmarking could not be taken up on account of seasonal effects on the quality of cotton, *viz.*, yellow stains, immature bolls (*kavdis*) and black leaf.

There was no controlled area under *Banilla* cotton, during the year and this variety is no longer cultivated in pure state.

Sholapur District. —The monsoon started at the right time, but there was a long break in rains till August 1943, and continuous rainfall thereafter in September and October 1943. The cotton sowings were thus delayed. The total cotton area was 12,945 acres against 12,314 acres in the previous year. Out of this, 3,883 acres were under *Jarila*, 2,149 acres under *Banilla* and 6,913 acres under mixed cotton.

Deccan.—The Deccan Canals area—The rainfall for the crop was, in general, adequate and fairly well distributed all over the Barsi-Nagar Tract; the only unfavourable feature of the season was the continuous and heavy rainfall during the latter part of September and early October. No pest or disease of any serious nature damaged the crop. The crop yield was estimated at 60 per cent of the normal.

The area under cotton in the Barsi-Nagar tract continued to be maintained at the same low level as in the previous year, due to the intensive "Grow More Food Crops" Campaign. It was only 79,000 acres. The reduction in area continued to be particularly marked in the canal irrigated tract where the policy of not allowing pre-seasonal watering was continued. The total area there was only 502 acres as against 3,000 acres during the last year.

The Scheme for multiplication and distribution of seed of *Jarila* cotton continued to be held in abeyance during the year; the progress in the extension of the area under this variety was, therefore, due to only natural spread. The areas under different varieties of cotton are estimated to be as under:—

S. No.	Name of Variety.	AREA (in acres)			
		1941-42.	1942-43.	1943-44.	Remarks.
1	Banilla	8,000	4,000	2,000	***.
2	Jarila	1,000	10,000	20,000	
3	N. R. Mixed	1,77,600	64,800	57,000	
	Total ..	1,86,600	78,800	79,000	

*** The increase in the area under *Jarila* was due to its marked superiority over *Banilla*.

During the season (November to January) at Ahmednagar the premiums obtained for *Jarila* ranged between Rs. 380 to Rs. 390 and those for *Banilla* between Rs. 320 to Rs. 325 against those for the local at Rs. 250 to Rs. 260 per *candy*.

Satara District :—*Jayavant* cotton is grown in the Walva and Tasgaon talukas of the Satara district, where 23,940 lbs. of *Jayavant* cotton seed, sufficient for about 3,420 acres, were supplied to the cultivators. The natural spread was estimated at 350 acres during the year 1943-44, bringing the total area under *Jayavant* cotton in the district to about 3,770 acres. The premium obtained for *Jayavant* cotton in the Sangli market over the local cotton ranged from Rs. 15 to Rs. 20 per *Nag* (1344 lbs.) of *kapas*. Reduction in the cotton area in the Satara district is due to the increased area under food crops.

Kumpta Dharwar Tract.—The work of extending the two improved varieties of cotton, *viz.*, *Jayavant* and Gadag No. 1, was carried out on an extensive scale in 13 centres through the approved agents and the Hubli, Gadag, Naregal, Annigeri, Nargund, Bagalkot and Bijapur Co-operative Cotton Sale Societies as well as through the Sale Shop at Haveri.

The total reserved area organised for multiplying pure pedigree seed of *Jayavant* cotton at different centres was 1,03,274 acres as against 1,38,921 acres in the previous year and that of Gadag No. 1 cotton 28,475 acres against 25,895 acres in 1942-43. The quantity of seed secured and stocked so far by the approved agents and Co-operative bodies from these reserved areas is about 54,20,240 lbs. of *Jayavant* and 8,72,300 lbs. of Gadag No. 1 sufficient to cover 5,42,000 and 87,200 acres, respectively, during 1944-45. In addition, some seed is stocked by the cultivators themselves from their crop. Owing to the shrinkage of cotton area as a result of the application of the Bombay Growth of Food Crops Act, there will be some reduction in the purchase of seed.

For distribution of the general pedigree seed stocked by the approved agents and the Co-operative bodies a sufficient number of seed depôts were opened in the interior of the tract at several places in each centre. The general area under pure *Jayavant* was 4,15,226 acres against 4,62,113 acres last year and that under pure Gadag No. 1 was 1,30,125 acres against 1,29,495 acres in the previous year. The total area under *Jayavant* and Gadag No. 1 was 5,18,500 acres and 1,18,600 acres as against 6,01,034 and 1,55,390 acres, respectively, last year. Besides, an area of about 1,34,700 acres under *Jayavant* and about 35,000 acres under Gadag No. 1 was covered by natural spread, making in all 6,53,200 acres under *Jayavant* and 1,55,600 acres under Gadag No. 1 during the year under report. The estimated yield of *Jayavant* cotton was about 90,000 bales against 70,000 bales and that of

Gadag No. 1 was 20,000 bales as against 10,000 bales of last year. Due to "Grow More Food Crops" campaign the area under cotton crop was reduced, but the yield was good.

A premium of Rs. 15 per *Nag* (1344 lbs.) of seed cotton in the case of *Jayavant* and Rs. 25 per *Nag* in the case of Gadag No. 1 was obtained in auction sales over local cotton sold in *bazar*. Even in private sales, *Jayavant* cotton fetched Rs. 8 to Rs. 10 more per *Nag* than the prevailing prices for Kumpta cotton. Similarly, Gadag No. 1 cotton fetched Rs. 15 more per *Nag* than the local rates for Dharwar-American cotton. The extra profit, secured to the cultivators of improved cotton is, therefore, Rs. 17,87,500 during this year as against Rs. 13,00,000 in the previous year. Though the yield is fairly satisfactory on the whole, the reduced demand and low price for cotton have had a discouraging effect on the cotton growers.

Since the consumers of cotton are not realising the importance of Agmarked bales due to one reason or other, Agmark work was worked out this year also as optional. As in the last year, two grade specifications, *viz.*, Agmark certified pedigreed and Agmark certified were continued and labels were given accordingly for reserved area and general area cotton. During the year under report, 2929 bales of *Jayavant* cotton were pressed under Agmark. Unless the millowners appreciate Agmark bales and are prepared to pay adequate prices for the Agmarked bales over the un-graded cotton, the Agmark work will not be very popular.

SIND.

1. *Area under cotton.*—Prior to the opening of the Lloyd Barrage canals, the annual area under cotton cultivation averaged slightly over 300,000 acres. With the advent of timely and assured perennial supply of water as a result of the opening of the Barrage canals and greater interest in cotton growing, the area has increased to 899,365 acres (including Khairpur State) during 1943-44 with an approximate outturn of 531,107 bales of lint (400 lbs. each). The area was divided between American and *desi* cottons as under :—

	British Districts.	*Khairpur State.*
American cotton ..	.. 788,629 acres.	63,358 acres.
Desi cotton ..	.. 44,084 ,,	3,294 ,,
Total	.. 832,713 ,,	66,652 ,,

An interesting feature of cotton growing in Sind has been the phenomenal increase in the area under improved American cottons and the great reduction in the acreage under *desi* cotton. The area under cotton this year was 163,820 acres more than in the previous year. The increase in area can be attributed to very high prices for cotton prevailing during the season and also more settled conditions in the district as compared with last year.

The following statement gives the area and outturn of improved varieties of cotton in Sind during 1943-44 :—

Variety.	British districts		Khairpur State	
	Area in acres.	Outturn in bales of 400 lbs. each.	Area in acres.	Outturn in bales of 400 lbs. each.
A. Sind-American.—				
Sind Sudhar	365,000	230,000.	55,000	22,500
M—4	195,000	119,000	..	..
289F.	191,629	106,900	5,358	2,017
Sind American 98	30,000	17,000	..	..
4F	7,000	4,040	3,000	1,460
Total American.	788,629	476,940	63,358	25,977
B. Sind Desi.—				
27 W. N. or N. R.	25,000	15,000	..	..
Desi	19,084	11,840	3,294	1,350
Total *Desi* ..	44,084	26,840	3,294	1,350
Grand Total ..	832,713	503,780	66,652	27,327

The season was quite normal for the cotton crop and average yields were obtained.

(2) *Cotton varieties grown and the seed of improved varieties distributed during* 1943-44.

The Agricultural Department has evolved improved strains of American and *desi* cottons which, on account of better yield, higher ginning outturn and superior spinning performance, have brought increased returns to the cultivator and have, therefore, been extended into general cultivation.

A. *Sind-American cotton.*—There are three improved strains of Sind-American cotton which are widely cultivated in different tracts of the Province.

1. *Sind-Sudhar* (*G. hirsutum*).—The area under this improved variety has decreased during the year. This variety is a selection from Punjab 289F imported into Sind in 1924 and is now the standard American cotton in Lower and East Sind. This is grown chiefly in Thar Parkar and Hyderabad districts. It possesses a staple length of 1″, gins 29 to 30% and spins 45 H.S.W.C. It gives a good yield under widely varied conditions.

2. *Sind-American 98* (*G. hirsutum*).—This variety covered an area of 30,000 acres during the year under report. It has been evolved by selection from ordinary 4F cotton originally imported from the Punjab, It has a staple of $\frac{7}{8}$″, a ginning outturn of 33% and a spinning value of 35 H.S.W.C. Sind-American 98 was found to be the most suitable type for cultivation in newly opened areas on the Right Bank of the Indus and is grown in the districts of Dadu, Larkhana and Upper Sind Frontier. Sind-American 98 is being largely replaced by the new variety M-4.

3. *M-4* (*G. hirsutum*).—This variety has been evolved from N. T. 21 (bulk). It has been under trial for the last few years and has been found suitable for growing in Eastern Sind where it is gradually replacing Sind-Sudhar in many tracts. It has also become popular on the Right Bank and has largely replaced Sind-American 98 on account of its earliness. It is earlier than S. A. 98 by about 4 weeks and therefore escapes frost which sometimes occurs very early on the Right Bank.

B. *Sind-Desi cotton*—has a special market on account of its rough, bright and white lint which is used extensively for mixing with wool. It is confined to Central Sind, being grown extensively in Nawabshah district, Sanghar taluka of Tharparkar district and to some extent to the Hala and Guni talukas of Hyderabad district. The improved strain, Sind N. R., evolved by the Department is very popular with the growers and covers over 60% of the total area under *desi* cotton in the British districts.

Sind N. R. (27 W. N.) (*Gossypium arboreum* var. *neglectum forma bengalensis* H. and G.) is the improved Sind-*desi* strain evolved by the Sind Agricultural Department by selection from the local *desi* stock. It gives 16 to 20% higher yield and 4 to 5% higher ginning outturn than the ordinary Sind-*desi*. It has a staple of $\frac{5}{8}$″ and ginning outturn of 40% and it spins 6 H. S. W.C.

3. Improved strains of Sea Island and Egyptian cotton (*G. barbadense*) have also been evolved by this Department.

They are, however, not cultivated commercially to any extent on account of uneconomic yields. They are maintained at the Cotton Research Station, Mirpurkhas, where work on long staple cottons is being carried out under a scheme financed by the Indian Central Cotton Committee.

4. *Quantities of seed of improved variety controlled and distributed.*— During the year 1943-44, large quantities of pure seed of improved varieties were made available by roguing areas grown under seeds distributed by the Agricultural Department. The following quantities of the seed were distributed for the *Kharif* of 1943 :—

	By the Agricultural Department directly.	By the factories directly.	Total.
	lbs.	lbs.	lbs.
Sind-Sudhar	64,800	65,000	129,800
M-4	29,000	30,000	59,000
4F-98	6,500	500	7,000
Total ..	100,300	95,500	195,800

PUNJAB.

The total area in the British districts of the Punjab was 2,602,263 acres (762,195 acres *Desi* and 1840,068 acres American) against 2,319,567 acres (735,048 acres *Desi* and 1,584,519 acres American) in the previous year. This represents an increase of 12% over the total area of last year, but 8% and 2% decrease on the quinquennial and decennial averages respectively. Medium and long stapled American cottons thus constituted 70.7% of the total Punjab cotton crop, the highest proportion ever yet attained. The increase in the area during the year under report is due entirely to the good prices which prevailed in the previous year. The total baled crop according to press returns was 920,188 bales of 400 lbs. each in the previous year.

Punjab-Desi Cottons.—The " Grow More Food " campaign brought down the area under *desi* cottons appreciably, a further decrease of 3½% having been effected in the area of such cottons over the figures of last year. Of the total area under *desi* cottons, 487,710 acres were occupied by the improved varieties given out by the Department of Agriculture and only 274,485 acres were under unselected local sorts. Among the improved varieties, 39 Mollisoni alone

covered 433,130 acres, which is 56.9% of the total Punjab-*desi* cotton crop and 88.8% of the area under improved varieties.

Punjab-American Cottons.—The long stapled varieties, namely, 289F/43, 289F/K.25 and L.S.S., continued to increase in popularity, this being the first year when each of these varieties individually possessed a markedly greater area than 4F, which hitherto was the most extensively cultivated American cotton. The total area under these improved long stapled varieties was estimated at 1,391,900 acres during the year under review as compared to 894,060 acres in the previous year. On this basis, these long stapled cottons represented 75.6% of the total Punjab-American crop. It may be noted that the area under long stapled varieties takes into account the acreage of two new strains also, namely, 124F and 199F, which, though not formally given out so far by the Department of Agriculture, are spreading in certain areas, chiefly in the districts of Multan, Montgomery, Dera Ghazi Khan and Muzaffargarh on their own merits. The estimated acreage under each of the American varieties during 1943-44 was as follows :—

4F	.. ..	440,700 acres.
L.S.S.	.. ..	516,900 ,,
289F/K.25 and 289F/43	.. .. ..	785,900 ,,
289F other than 289F/K.25 and 289F/43		1,400 ,,
124F	.. ..	86,200 ,,
199F	.. ..	1,500 ,,

The American strains have a well marked regional suitability. L.S.S. is predominant in the districts of Lyallpur, Sheikhupura and Sargodha—289F/43 is mostly grown in Dera Ghazi Khan, Muzaffargarh and major portion of Montogomery district. The new strain, 124F, is spreading in the entire south-western Punjab and also in the Lower Bari Doab Canal Colony.

87,222 *maunds* of cotton seed of improved varieties (*Desi* 6225 *maunds* and American 80997 *maunds*) were sold by the Agricultural Department to cultivators during the year.

CENTRAL PROVINCES AND BERAR.

The total area under cotton in the Central Provinces and Berar during the year 1943-44 was 30.9 lakhs acres against 32.7 lakhs acres in the previous year. The decrease is attributed to the " Grow More Food " Campaign.

V. 434.—The area under Verum 434 was 5.32 lakhs against 6.62 lakhs acres in the previous year. This strain possesses a fine, strong staple, about $\frac{7}{8}$" in length, and is capable of spinning up to 30's highest standard warp counts. The average premium obtained during the season 1943-44 was Rs. 31-8-0 per *khandi* of lint on *Jarila* (I.C.C.). 45, 940 maunds of seed were distributed for sowing purposes through departmental, co-operative and other agencies.

BURI 107 :—The total area under this variety in different parts of the province was 1.25 lakhs acres out of which 45,000 acres were grown in the Burhanpur tahsil, where a seed distribution scheme financed by the Indian Central Cotton Committee was in progress. This strain possesses a fine staple, about 1" in length and is capable of spinning up to 40's highest standard warp counts. The average rates for *desi* were Rs. 13 and Rs. 18, respectively, per *maund* of *kapas*. The total quantity of seed distributed in the tahsil through Government seed depôts and the Tahsil Agricultural Associations amounted to Rs. 2,931 *maunds*, in addition to 1,282 *maunds* in other parts of the Province and adjoining States.

MADRAS.

The total cotton area in the Madras Province during 1943-44 according to the forecast issued on 23.8.44 was 2,146, 100 acres against 2,209,889 acres in the previous year as reported in the Season and Crop Report. There was a fall in acreage under all varieties except 'Tinnies.'

A. Cambodia Cotton.—The area under Cambodia cotton during the year was 501,100 acres of which 399,353 acres were under improved strains, (*vide* Table 1). This works out to 79.69% which is much higher than the last year's record of 59.5%. The largest concentration existed in Coimbatore and Madura Districts and an increase of 14% in Co. 2 was mainly due to the extended cultivation in the latter district. The area under Co.3 was more than doubled and phenomenal increases were noticed in Salem and South Arcot districts. The area in Ramnad district has dwindled down to the negligible figure of 40 acres on account of the preference evinced for Co.4 and alternative food crops. South Arcot, Tinnevelly and Madura have registered substantial increases under Co.4. 920 and x4463 were practically confined to Coimbatore and their strains went up by over 50%. The demand for seed was met by arranging seed farms run by the Madras Agricultural Department, Tiruppur Co-operative Sales Society and Village Co-operative Seed Societies

in Ramnad. In all cases the crop was grown and ginned under expert supervision. The seeds were purchased after testing the germination capacity at a premium from the seed farm growers and sold to farmers in sealed bags. Strains Co.2, Co.3 and Co.4 were concentrated in Coimbatore, Salem and Ramnad Districts, respectively. A scheme financed by the Indian Central Cotton Committee, Bombay, continued to be in operation for the multiplication and distribution of Co.3 in Salem district.

TABLE I.

Cambodia Cotton : Total area 501,100.

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
Chingelput	Co. 2	56	..	5
South Arcot		1,370	23,750	2,670
Chittoor		630	..	43
North Arcot		3,048	..	342
Salem		588	Not available.	200,030
Coimbatore		327,621	3,197,320	181,854
Trichinopoly		1,180	21,025	6,083
Malabar		11,200	27,500	1,500
South Canara		30	..	3
Madura		28,892	84,000	96,620
Ramnad		5.915	..	1,055
Tinnevelly		1,752	20,138	2,630
Kurnool		32	..	112
Anantapur		1,004	3,810	491
Cuddapah		1,059	..	125
East Godavari		..	..	27
Total ..		384,345	3,377,543	313,590

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
Chingelput	Co. 3	3	..	2
South Arcot		2,692	2,850	1,804
Chittoor		870	..	110
North Arcot		233	..	25
Salem		227,360	..	9,280
Trichinopoly		960	10,070	1,100
Total ..		232,118	13,420	12,361
Chingelput	Co. 3	2,825	..	287
South Arcot		26,874	17,284	6,897
North Arcot		326	..	29
Madura		39,694	40,000	8,110
Ramnad		54,044	Not available.	16,885
Tinnevelly		10,850	42,832	5,411
West Godavari		55	..	4
Kurnool		..	..	500
Anantapur		654	290	102
Total ..		135,322	100,406	38,225
North Arcot	920	50	..	3
Coimbatore		13,935	382,280	21,387
Ramnad		711	..	59
Total ..		14,696	382,280	21,449
Coimbatore	x4463	66,837	218,400	13,328
Trichinopoly		4,365	..	400
		71,202	218,400	13,728
Total Cambodia under improved strains		837,683	4,092,049	399,353

Co.2 continued to occupy the largest individual area. Strains Co. 3 and Co.4 were found to be more remunerative than Co.2 in the districts of Salem, South Arcot, Tinnevelly, Madura and Ramnad and would eventually replace it to a very great extent. 920 and x4463 were more popular than Co.2 with the cultivators in portions of Coimbatore district. In quality and earliness, Co.3 and Co.4 maintaind their levels.

B. Tinnevellies.—260,544 acres (Table II) were under improved varieties of Karunganni cotton out of the total area of 597,500 acres. This works out to 43.61% which is lower than that (53%) reported for 1942-43. K.1 continued to be the main strain under distribution and the fall in the percentage was mainly due to the great reduction in the area under cotton in Tinnevelly district.

TABLE II.

Tinnevellies :— Total area 597,500.

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
Madura	K. 1	13,073	137,000	14,168
Ramnad		64,924	..	91,825
Tinnevelly		180,482	172,320	74,256
North Arcot		328	..	32
Coimbatore		77,166	1,109,025	80,089
Total ..		335,973	1,418,345	260,370
Coimbatore	C. 11-2	795	2,250	174
Total Tinnevellies.		336,768	1,420,595	260,544

C. Salems.—Karunganni strain K. 1 occupies an area of 562 acres in Trichinopoly district alone out of a total acreage of 40,800 under this trade variety.

TABLE III.

Salems :— Total area 40,800.

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
Trichinopoly	K. 1	150	6,430	562

D. White and Red Northerns.—The area under this variety was 167,000 acres against 175,000 acres in the previous year. 57,008 acres or 34.1% of the total area under this cotton were under improved strains. The substantial reduction in the percentage during the year under report was due to want of suitable organisation for both multiplication and distribution of improved types.

TABLE IV.

White and Red Northerns :— Total area 167,000.

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
Kurnool	N. 14	300	..	25,100
Kurnool	N. 23	..	..	400
Kurnool	H. 1.	520	..	8,517
Cuddapah	H. 1.	16,081	..	22,991
Total White and Red Northerns		16,901	..	57,008

E. Westerns.—The total area under this cotton was 715,000 acres in 1943-44 against 727,000 acres in 1942-43. The area under improved varieties was 426,448 acres representing 59.6% of the area under cotton. The largest increase was noticed in Bellary district which registered 335,000 acres under H.1 compared to 149,528 acres during the previous year.

TABLE V.

Westerns :— Total area 715,000.

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
Bellary	H. 1	560,509	2,824,170	325,000
Anantapur		36,668	871,700	91,448
Total Westerns ..		597,177	3,695,870	426,448

F. Warangal and Cocanadas.—The total area under this denomination including 'chinnapathi' was 124,700 acres compared to 131,100 acres during the previous season. Only 215 acres were under the improved strain x20. The rate of spread was slow since no suitable organisation for its multiplication and distribution exists.

TABLE VI.

Warangal and Cocanadas :— Total area 124,700

District.	Name of Strain.	Quantity of seeds distributed in lbs. by		Total area in acres.
		Department.	Private Agency.	
East Godavari	x20	..	..	3
Kistna		100	..	12
Guntur		..	..	150
Nellore		..	..	50
Total 'Warangal and Cocanadas'		100	..	215

UNITED PROVINCES.

The revised final area under cotton in the province during the season 1943-44 amounted to 372,361 acres against 311,486 acres (revised) last year, showing an increase of 60,875 acres or about 19.5%. Compared with the average area for the previous 5 and 10 years, the area during the year under report shows a decrease of about 27 and 36% respectively.

The revised final outturn of the crop (lint) was 112,000 bales against 92,000 bales (revised) last year, showing an increase of 20,000 bales or about 22%. As compared with the average outturn for the preceding five and ten years, the outturn this year shows a decrease of about 28 and 37%, respectively.

Improved Varieties.—C520 which is an improved strain of the 'short staple' group, suffered in its extension owing to unfavourable climatic conditions during the present and past seasons. Perso-American was the principal variety recommended by the Department for extension in suitable areas in the Western Circle. The area sown under Perso-American and C520 during 1943-44 in the whole province and the amount of the seed distributed by the Department of Agriculture are given in the following table.

Variety.	Total area under the variety (including natural spread.)	Amount of seed distributed by the Department.
		Mds.
P. American	21,294 acres	4380
C520	11,063 ,,	1023

The work of the extension of Perso-American Cotton is now progressing in pursuance of the scheme financed by the Indian Central Cotton Committee although on account of very high prices of food-grains and low prices fixed for cotton, the advance is not as rapid as desired.

Chief Characteristics of the Improved Varieties.—C520 cotton is a pure line selection from the 'roseum' type of U. P. Bengals, originally extracted from the material collected in Saharanpore and Bijnor districts as early as 1920-21. It yields high under irrigated and unirrigated conditions. When grown on a commercial scale at the Government Cotton Research Farm, Raya (Muttra) the variety yields about 9 to 10 maunds of *kapas* per acre.

With a staple length of about 0.73", ginning about 35-37 p.c. it is capable of spinning up to 10 to 12½ highest standard warp counts.

The variety has spread in general cultivation in the Middle and Upper Doab and is gaining ground almost all over the cotton growing areas in the U. P. Recently, it has been in demand from many of the Central India States and Rajputana also. When marketed pure, its *kapas* is valued at about Rs. 8 per *maund* more than that of the ordinary *desi*.

The Perso-American Cotton is a selection from the American types of cotton imported from Persia (Iran) and acclimatized in the U. P. When grown on commercial scale at Raya and other suitable areas, *e.g.*, Budaun, it gave an yield up to 13 to 14 *maunds* per acre. With a staple length of 0.85", a ginning outturn of 30 to 32% it is capable of spinning up to 28 to 34 highest standard warp counts. The *kapas* of this variety ordinarily fetches a premium of Rs. 2-8 to Rs. 3 per *maund* over *desi*, but during the last two seasons it was sold at a price of about 35 to 50% higher than the local *desi* cotton.

HYDERABAD STATE.

The total area under cotton in His Exalted Highness the Nizam's Dominions during the year 1943-44 was 4,150,368 acres.

Gaorani 6.—Gaorani 6 is a selection from the indigenous *Gaorani* or *bani* cotton of the State. Pure seed obtained last year from the reserved areas, amounting to 5,820,960 lbs., was purchased and distributed to cultivators under departmental control both on the *taccavi* system and on cash payment. An area of 363,810 acres in Mudhol, Biloli, Deglur, Nanded and Hadgaon taluqas of Nanded District, Nirmal taluqa of Adilabad District and Hingoli taluqa of Parbhani District was covered by this seed. Reserved areas of the variety were formed in Nanded and Mudhol taluqas, the crops of which were rogued and the seed obtained for further distribution.

Parbhani-American No. 1.—This cotton is a selection from the American component of local crop of Parbhani District. Pure seed was obtained last year from the reserved area, amounting to 94,640 lbs. It was distributed to cultivators under departmental control over an area of (11;830) acres for further multiplication.

Jarila Cotton.—Jarila cotton is a selection of the Verum variety. Pure seed was obtained last year from Jalgaon through the Department of Agri-

culture, Bombay Presidency, and multiplied in the taluqas of Sillod, Bhokardan, Jalna and Ambad of Aurangabad District. A reserved area was also formed last year and the resulting crop rogued. Pure seed amounting to 636,856, lbs. was obtained from this reserved area during the season under report and distributed to cultivators under departmental control to cover 63,685 acres.

Jayawant Cotton.—This cotton was introduced in the southwestern portion of Raichur District in the year 1931 by importing the seed from the Co-operative Cotton Sale Society at Hubli and it has made steady progress since then. During the year 1943-44 the quantity of seed produced was 385,037 lbs. and the area covered 39,178 acres. The natural spread under this strain covered 164,439 acres.

The Department of Agriculture, H. E. H. the Nizams Government, has set up an organisation for seed multiplication, its distribution and the marketing of the produce. The predominant features of this organisation are as follows :—

(*i*) Special staff is maintained by the Department to ensure every year the purity of the crop of the general as well as the reserved areas. Close supervision is maintained throughout the life of the crop and also at the time of marketing, ginning and pressing of the produce.

(*ii*) A Special *taccavi* grant is provided by the Government every year to purchase all the seed of the reserved area for distribution to cultivators of the general area.

(*iii*) The purity of the produce of the general as well as the reserved areas is guaranteed to the trade.

(*iv*) On the strength of both the superiority and guaranteed purity of improved varieties, a substantial premium on the prices of local varieties is secured from the trade.

With this special organisation in which a collaboration of interests of both the cultivator and the purchaser alike is effected, a rapid extension of the area under improved varieties is achieved.

BARODA STATE.

The total area under cotton in the State during 1943-44 was 584,733 acres against 688,000 acres in the previous year. The decrease was largely due to the "Grow More Food Crops" campaign.

Navsari District.—The total area under 1027 A.L.F. in this district was 165,000 acres, of which the controlled area was 17,312 acres. Except for a small wilt affected area where B.D.8, a resistant strain, was grown, the whole of the district was under 1027 A.L.F. commercial cotton. The total seed issued by the Department was 225,056 lbs. Attempts to switch over to —(Seg. 8-1)—'Suyog' from 1945 are being made and 51,975 lbs. of seed of 'Suyog' have been stocked.

Baroda District.—In this district the Cotton Control Act has been applied since May 1943 making B.D.8 and B.9. the standard cottons for the black and *Gorat* soils of the district, respectively. B.D.8 variety was cultivated in seven *talukas, viz.*, Karjan, Shinor, Dabhoi, Sankheda, Tilakwada, Baroda and Padra, while B.9 was grown in Waghodia and Savli (*Gorat* area). The total cotton area in this district during the year was about 330,000 acres of which 250,530 acres were under B.D.8. The premium realised over *Jarila* by the certified B.D.8 ranged from Rs. 120 at the beginning to Rs. 20 at the close of the season. 2,501,440 lbs. of different grades of B.D.8 cotton seed have been distributed for sowing during 1944-45. The Indian Central Cotton Committee has sanctioned a new seed scheme, which aims at the replacement of B.D.8 cotton by 'Vijaya' over approixmately 300,000 acres in the black soil areas of Baroda State. About 2,470 acres of 'Vijaya' were grown during the year and 19,835 lbs. of controlled seed distributed by the Department.

B.9 has been selected as the standard cotton for the *Gorat* or light soil which covers an area of about 150,000 acres and is mainly confined to the Savli and Waghodia *talukas*. A scheme to expand this cotton has been in operation since 1st September, 1942. The area under this variety during the year was 77,000 acres in Baroda district and 1,700 acres in Mehsana district. The certified cotton fetched on an average Rs. 3 more per *bhar* over uncertified cotton. About 883,466 lbs. of controlled seed were distributed by the Department in Baroda and Mehsana districts.

Mehsana district.—The Department is concentrating on Wagad 8 in this district and is building up a seed organisation for this variety. The scheme sanctioned by the Indian Central Cotton Committee to expand this type came into operation in December 1943. Wagad 8 covered an area of 21,859 acres. Wagotar or Seg. 4-1, a new improved strain, which has been found superior to local Wagad, has been introduced into Baroda and the area covered by it during the year was 1,692 acres. The Department distributed 126,358 lbs. of Wagad 8 and 27,955 lbs. of Wagotar seed.

Amreli district.—The cotton on which the Department is at present concentrating in this district is C. 520. During the year the area under it was some 2,765 acres. A selection from local Mathio, S.31, has been found to be consistently good during the past two years and its seed has been multiplied over an area of 12 acres under the name of 'Pratap.'

RAJPIPLA STATE.

The Rajpipla Cotton Improvement Act, which was passed in 1921, prohibited the import and sowing of *Goghari* or any other short staple cotton in the State. The export, likewise, of cotton by rail or boat is entirely prohibited except in the form of fully pressed bales, an exception being made only in favour of *bona fide khedut*s who are allowed to take their cotton in carts for sale outside the State. During the year under report, the best seed of the 1027 A.L.F. variety was obtained through the Cotton Superintendent, Surat, and supplied by the State to the *Kheduts*. This was the only strain grown throughout the State.

The monsoon and the weather conditions were very favourable and as a result the outturn of cotton crop was higher than normal in the season.

The total area under cotton cultivation throughout the State during the year was about 109,337 acres the total outturn was 49,252 bales pressed within the State exclusive of about 7,068 bales pressed outside the State limits from cotton transported by some cultivators of the outlying limits for sale outside the State. The cotton grown in the State has attained a high standard of reputation on account of its purity and finds ready customers in the market.

CHAPTER IV.

RESEARCH.

A year is a short period in the work of cotton crop investigations and it seems needless to repeat at this brief interval the explanations of the aims and methods of the experiment stations given in previous reviews. Due progress has, however, been made in many directions on lines laid down in the programmes already established. The main line of work under the various research schemes of the Committee is plant breeding and selection. Its object is to enable the grower to secure the most profitable yield. To do this there have to be taken into account (*a*) the quality of the lint on which demand and prices depend, and (*b*) yield.

A number of research schemes among which the most important are those for cotton breeding for the improvement of quality, are in operation in the various cotton growing Provinces and States. The majority of these schemes are financed entirely by the Committee, while the cost of others is borne partly by the Committee and partly by the Provincial Government or State concerned. Since January 1943, the expenditure on new schemes and extensions of old schemes sanctioned by the Committee, which are for the benefit of cotton growers, is being met from the Cotton Fund at the disposal of the Government of India. Research on cotton technology is carried on at the Committee's Technological Laboratory. In addition, trained Technological Assistants are posted at the Cotton Research Stations at Lyallpur, Mirpurkhas, Cawnpore, Surat, Dharwar, Coimbatore and Nanded, to help the botanists in charge in their work of breeding improved varieties of cotton.

RESEARCH ON COTTON TECHNOLOGY.

Research on cotton technology and the testing of cotton fibres, yarns and cloth are carried on at the Committee's Technological Laboratory. A brief summary of the work done during the year is given below; full details are given in the Annual Report of the Laboratory which is issued as a separate publication.

The year under review witnessed an appreciable increase in the activities of the Laboratory in many directions. In addition to the usual tests done at the Laboratory, tests were also carried out for several Empire countries

and allied Governments such as Belgian Congo, East Africa, etc., to help them in their work of improving their cottons. The total number of samples received for tests rose from 1129 in the last year to 1514 in the year under report, representing an increase of nearly 34 per cent. The number of reports issued from the Laboratory rose from 234 to 379 showing an increase of 62%. It is interesting to note that the number of samples tested on payment of fees in the Testing House of the Laboratory was more than double of that received last year, a special feature being a large increase in the number of samples sent for tests by cotton mills. In addition to the reports issued from the Laboratory, technical advice was given to several mills who referred their difficulties or sought information on technical matters.

Among the tests carried out on agricultural samples, mention may be made of cottons grown pure and in mixed cultivation in Hyderabad State and Ujjain, cottons grown on *chalka* and *regur* soils in Warangal, *desi* cottons grown in wilt-free and wilt-sick soils at Indore, Co.2 grown in Mysore State from seed irradiated with X-rays, L.S.S. grown after giving different photo-period treatments to seedlings, dye absorption capacity of Cocanada strains etc., etc. In the attempts made at several stations to develop long staple varieties which would satisfy the requirements of the mill industry for fine spinning and could be grown at economic levels, the valuation reports issued from the Laboratory, and prepared by an expert grader, help the breeders to estimate the acre cash values of their improved strains.

As usual, spinning tests were made on representative standard and trade varieties of Indian cottons, the results for which were published for general information in the form of technological circulars and bulletins.

Tests were made for the second year on a large number of samples of 1027 A.L.F., V, 434 and Sind *Sudhar* cotton in order to fix suitable criteria for quality control in applying AGMARK to these cottons. The work on the scheme for the survey of cellulose bearing materials of India on behalf of the Council of Scientific and Industrial Research was also continued and carried a stage further during the year.

In addition to the above-mentioned tests good progress was made in technological investigations which are either of a fundamental nature or are of direct practical value to the trade and the industry. These include experiments on the pre-cleaning and ginning of Indian cottons, a study of the effect of employing different speeds of beater and fan in the crighton opener,

study of the effect of using different weights and front roller speeds in the draw-frame, tests on combing of good quality Indian cottons, optimum treatment for reducing neppiness in neppy cottons, tests on mixings of Indian cottons with special reference to their fibre-properties, comparison of different methods of measuring halo-length and lint length and standardisation of a technique for halo length determination, prediction of strength of yarn spun with different twist multipliers, etc., etc.

Among the other investigations mention may be made of (1) the size absorption capacity of different Indian cottons, (2) kier boiling and bleaching of linters and yarns, (3) preparation of cellulose films and sheets from Indian linters, (4) preparation of cords for belts and tyres from Indian cottons, etc., etc.

Bulletins and circulars dealing with (1) spinning tests on mixtures of staple fibre with Indian cottons, (2) preliminary observations on the suitability of cotton cloth for covering bales instead of hessian, (3) the effect of storage under certain specified conditions on the quality of Indian cottons, (4) variations in copper number, cuprammonium fluidity and fibre-strength of cotton stored under high humidity (5) variation of fibre length in a bulk sample of cotton and in a single seed of the bulk and (6) pre-cleaning and ginning tests on Indian cottons were published during the period. The Laboratory also took part in the exhibition held in Bombay in March 1944 under the auspices of the First All-India Textile Conference.

FUNDAMENTAL RESEARCH.

Fundamental research on cotton is carried out at the Institute of Plant Industry, Indore, which was established with the object of providing a central research station in the black soil areas of the Malwa Plateau. In April 1940, the working of the Institute was re-organised as a result of which fundamental research on genetics and plant breeding, physiology and field plot technique is carried out under a special scheme—the Cotton Genetics Research Scheme. An annual subsidy of Rs. 30,000 is, however, given to the Institute for work on other crops for the Member States, as well as for seed multiplication, distribution and demonstration and such agronomical and chemical investigations as might be considered necessary for the benefit of the States. The work of the Institute, *viz.*, varietal tests and seed multiplication, followed the lines of the previous years. A detailed account of this work is published separately

in the Annual Report of the Institute. A review of the progress made during the year under the Cotton Genetics Research Scheme is given below :—

Genetics :—

Lintless Genes.—The genetics of two more lintless mutants, Nandyal lintless (*G. arboreum*) and Viramgam lintless (*G. herbaceum*) has been studied. In the latter, a new type of stellate hair with 20-30 short arms has been discovered and this has proved a simple recessive to the normal stellate hair which has only 8-10 but longer arms. Genetical studies on fuzz grades in *G. hirsutum* show that the simple dominance of tufted over fuzzy seed holds good only when the parents belong to the same variety of cotton. Different varieties of *G. hirsutum* have different modifier backgrounds for this character and crosses among fuzzy grades coming from different varieties always give a continuous range of types from low tuft to high fuzz grades in the F_2[6]. It has also been observed that selection for very low fuzz grades in some progenies has led to obtaining sparse linted types showing a partial association between low fuzz grade and low fibre density.

X-ray works.—Large scale yield trial with bulks from X-ray progenies has confirmed the superiority of them over control in yield, ginning percentage and lint length. The bulks have recorded 20-30% increase in yield, 2% increase in ginning and 1 m.m. improvement in halo length, all increases being significant.

Locular Composition.—The attempt to evolve a homozygous 5-lock boll type in *G. arboreum* referred to last year has confirmed the simple recessive nature of this to the normal 3-4 lock condition. The gene responsible is, however, unstable in that while some of the progenies selected from the 5-lock family are breeding pure for the 5-lock condition, others always throw a very small number of plants with 3 lock bolls.

Red Leaf in G. hirsutum.—Considerable work has been done during the year on the appearance of the red leaf (different from Jassid red) and incidence of jassid in *G. hirsutum* cottons. That this character has a genetic basis has been confirmed from observations on *hirsutum* varieties, most of which appear to carry the character in a heterozygous condition, as well as from F_2s of definite crosses. The year's work has shown that the character, though genetic, is considerably influenced by the environmental conditions under which the plant grows. While some preliminary

observations have been recorded on the environmental effects, work programmed for the coming season should define the particular environmental conditions that affect the expression of the character. While the information available so far would appear to show that this character can be eliminated by breeding where it is considered undesirable, under Indore conditions the red leaf plant appears to suffer from no disadvantage and its earliness in maturity is in its favour.

Jassid Resistance.—An attempt was made in the previous season to score plants for different degrees of jassid resistance on the basis of leaf crumpling. Progenies from four apparently homozygous families, jassid resistant and jassid susceptible with and without red leaf, were grown in a replicated experiment. In the progenies where the red leaf was not present the classifications for jassid resistance and jassid susceptibility has proved absolutely reliable. The main difference between the two groups appears to be that while progenies belonging to both the groups show slight jassid incidence in the early stages, the resistant plants are able to throw off the attack and grow normally later while the susceptible plants continue to suffer right through. Though the distinction between the two groups where red leaf was present was not apparent on the incidence of jassid, the two groups do appear to be distinct from their final productivity, the susceptible group producing very much fewer bolls than the resistant group. It would appear quite feasible to use the amount of leaf crumpling produced as a criterion for judging jassid susceptibility in breeding work. In fact, the variation in hairiness of the plant body which character is generally related to jassid incidence was not sufficient to distinguish the susceptible and resistant families in the material studied here. That the jassid attack could be very serious is clear from the fact that in the susceptible groups 80 per cent of the plants give less than two bolls per plant and several of them no bolls at all.

Wilt Work.—Some further progress has been made in the study of wilt and breeding for wilt resistance. Twentytwo plants which had been selected out of the Glass House test were grown in the field for obtaining more seed. Several of these belong to the Malvi type although coming from the Malvi x *Jarila* cross. The best of these in halo length and ginning percentage will be put under a small bulk trial in the coming season. The homozygosity test with some progenies under intense wilt conditions in plots have brought out further improvement in wilt resistance in that 2 progenies of Dhar 43 (family 2) do

not show heterozygosity for wilt infection and one of them is also slightly better than the bulk in halo-length. Breeding for wilt resistance has been taken a step further in that small bulks of a few selected progenies from *Jarila* x Malvi cross which are as good as Jarila in fibre quality and field resistance for wilt and as good as Malvi in yield are now available for undertaking proper yield trials.

Study of the potentialties of different ecotypes with regard to combination of economic characters.—With regard to the study of the potentialities of different ecotypes of *G. arboreum* as parents, the F_1 data have now been completely analysed and it is found that every character that has been examined shows a clear heterosis, its magnitude, however, differing in individual hybrids. The analysis of the F_2 data was taken up during the year. Examination of F_2 halo length shows that as in F_1s, the F_2 means are consistently higher than the parental averages but the excess over parents is considerably less than in the F_1s. While the reduction in F_2 as compared to F_1 is more or less uniform among the 5 superior parents, it is very much variable in the Bengals parents. It is also seen that the F_2 means are generally in the same order as the parents involved with the exception of C.520 and R. 18 strains which give larger F_2 means than is indicated by their own values. There are also differences in F_2 variability in the different crosses some showing more than others. Both among superior and Bengals parents F_2 variability is generally less in those crosses where F_2 means are higher and this shuld set a limit to improvement by selection. Analysis of the F_2 data for other characters will be continued and meanwhile a replicated trial with 400 F_3 progenies from random F_2 plants has been carried out during the year.

Interspecific hybridisation.—Under interspecific hybridisation about 22 bolls have been obtained by crossing the doubled hybrid, *G. arboreum* x *G. thurberii* with *G. hirsutum*. The lint in these bolls is brown and short but silky and strong. It has been found that the *thurberii* crosses do show some resistance to boll worm attack in the early stages, just when the flowers are opening. The other interspecific hybrid *G. hirsutum* x *G. raimondii* was self sterile but when doubled became partially self fertile. The doubled hybrid does not, however, give fertile seeds when crossed with *G. hirsutum*. While *G. raimondii* is stated to be jassid resistant in Peru, under Indore conditions it does get attacked producing the characteristic leaf curl.

Physiology.

Bartlett's ' rate index ' with some modifications named ' earliness index ' has been used as an alternative to node number for denoting earliness. It cannot be said yet that this index is superior to node number. Separation of larger and smaller seed for sowing purposes in *Jarila* appears to be worth while in that the larger seed fraction which is about half of the whole gives a 20% increase in yield than the unselected seed. The experiment has to be repeated on a larger scale to confirm the results. An experiment with different placements of two fertilisers, ammonium sulphate and groundnut cake to supply 40 lbs. per acre failed to give any significant difference in yield mainly due to a high error resulting from high differences in stand. So far as germination is concerned, groundnut cake either sown with the seed or placed below the seed in the same furrow affects the germination very considerably while ammonium sulphate placed below the seed affects germination only to a small extent. The experiment will be continued omitting such treatments that affect germination as trials elsewhere with different placements of fertilisers for cotton do give yield increases of 23 to 100 per cent. To determine the place effect on yield, ginning percentage and halo length, pure *Jarila* seed obtained from three different sources, Indore, Akola and Jalgaon was grown in a replicated experiment at Indore and Akola. The sources of seed do give significant differences in yield and other characters. While there are differences in the seed weight of seed sown, these differences tend to be maintained in the harvested produce also which indicates that there could be genetic variability with regard to seed weight in established commercial varieties. The point that Hutchinson had drawn attention to, namely, that the selfed boll gives less yield of *kapas* than open-pollinated boll does appear to be correct in a *desi* cotton variety during the year. This has to be confirmed by further tests.

Statistics.

A discriminant formula for selection for yield was described last year based on a wide range of *arboreum* varieties obtained from all over India. A similar formula was derived during the year from an experiment with selections from local Malvi cotton. Both the formulæ are given below for comparison. The two are very similar except for the coefficient for ginning percentage. Last year's formula suggested that selection for a higher ginning percentage would result in lowering the yield of both seed cotton and lint. The coefficient

for ginning percentage obtained for Malvi selections though still negative is now very much smaller. This would show that within Malvi selection for higher weight of seed cotton per seed though important in comparison to other characters is not disproportionately so while selection for ginning percentage has very little effect on the yield of seed cotton. The discriminant formulæ should naturally differ according to the range of variability in the material tested and which of the two formulæ should be used will depend upon whether the breeder is dealing with material of a small homogenous group or widely varying material as in a hybrid population.

	For yield of seed cotton.		For yield of lint.	
	Whole range of *arboreums*.	Malvi cotton.	Whole range of *arboreums*.	Malvi cotton.
No. of bolls per plant	+ 0.498	+ 0.596	+ 0.447	+ 0.581
No. of seeds per boll	+ 0.325	+ 0.393	— 1.569	+ 0.368
Weight of seed cotton per seed.	+ 3.093	+ 0.777	+ 5.029	+ 0.800
Ginning percentage	— 2.041	— 0.037	— 1.775	+ 0.835

COTTON RESEARCH IN PROVINCES AND STATES.

BOMBAY.

(a) **Broach Cotton Breeding Scheme.**—The Cotton Breeding Scheme at Broach has been in operation since April 1932. The original object of this scheme was to obtain, by selection or hybridization, suitable types of cotton possessing wilt-resistant, high yielding, high ginning and superior spinning qualities, to replace the local mixture, a large proportion of which consisted of *Goghvri*, a short staple, high ginning (40%) variety. In view, however, of the Committee's policy to replace, wherever possible, short staple with medium and long staple cottons, attention is now being concentrated on wilt resistance, high yield and fibre length.

The breeding of wilt-resistant types originally formed part of the Broach Breeding Scheme, but as it was considered desirable that this work should be done under optimum conditions of wilt infection, and as the required conditions, especially soil temperature in pots, were difficult to maintain at Broach,

this part of the work was transferred to Poona in June 1935, together with similar work on cottons for the Jalgaon tract.

The synthetic strain '*Vijaya*' (Segregates 1-2 and 1-6) evolved under the scheme is stated to be highly wilt-resistant besides possessing a ginning percentage of 41 against 33.7% of B.D.8 and 41.3% of Broach Local and a spinning value of 38s compared to 38-1/2s of B.D.8 and 13-1/2s of Broach Local. In respect of yield, it is reported to be on a par with B.D.8.

During the year under review, 8 strains, 3 derived from (B.D. 8 ×G.A.26), —Segs. 30-57, 54-59, 73-33, 4 from (B.D.8×G. A. 26)×B.D.8—Segs. 1-2, 1-6, 3-50 and *Vijaya*—, and P.G.L.7-29 were tested against B.D.8 and Broach Local in a replicated variety trial in wilt-free soil. None of the strains was found to be significantly better in yield than B.D.8 but all of them gave a higher ginning outturn than B.D.8 by nearly 8%. *Vijaya*, 1-2 and 1-6 gave 60, 80 and 101 lbs. more lint per acre respectively than B.D.8. In the test with the above eight strains against B.D.8 and Broach Local on the wilt-infected soil, B.D.8 and all the strains were found to be free from mortality and partial wilt. The yield data showed that *Vijaya*, 1-6, 54-59 and 73-33 were on a par with B.D. 8. Twenty-seven selections are reported to have been made for early maturity from 9 promising early types, *viz.*, B.D.8 early, early selection 2, Maktampore selections 2-1, 2-2, 2-3, 2-5, 2-6, 2-7 and 2-8; the tests showed that these nine types matured 7 to 10 days earlier than mass B.D.8 and *Vijaya*. They were also fairly uniform in respect of economic characters.

Under the wilt breeding part of this scheme, the object of which is to evolve a cent percent wilt-resistant type, from the material availabe at Broach, testing was confined to 30 progenies in pot culture at Poona, comprising 7 cultures of Seg. 1-2, 7 of Seg. 1-6, 1 of Seg. 5-18, 1 of Seg. 7-29 and 1 of Seg. 3-1. In all, 3,177 plants were under observation and 273 plants were selected for transplanting. It was observed that the Segs. 1-2 and 1-6 are not yet free from wilt, but the former showed a higher degree of resistance than the latter. It is stated that the study of F_2 generation of the cross (K.F. ×G.E.5, a susceptible cotton) has confirmed the results obtained previously with (K.F.× 1027 A.L.F.), *viz.*, that resistance to wilt in *G. harbaceum* is due to a single factor.

(b) **Jalgaon Cotton Breeding Scheme.**—This scheme has been in operation since April 1932. Its original object was to obtain, by selection or hybridi-

zation, suitable wilt-resistant types with heavy yielding, high ginning and good spinning qualities to replace the local mixture of N.R. and *Banilla* cottons in Khandesh. Wilt breeding work was originally included in the Broach and Jalgaon Cotton Breeding Schemes, but, in August 1936, it was decided that the wilt work should be treated as a separate scheme from the 1st April, 1937. In July 1941, the wilt-breeding scheme was extended up to 31st March, 1947.

During the year under report, four Dokras cultures and seven selections derived from the cross (*Jarila* ×N.R. 5) were tested against *Jarila* for yield at Jalgaon. Two derivatives from the cross, 403-5 and 670-4, gave significantly better yield than the control. All of them with the exception of one Dokras culture, 4-G-2-3, were, however, superior to *Jarila* in ginning outturn. A similar test conducted at Dhulia confirmed the superiority of the two selections referred to over *Jarila*.

Under the wilt breeding part of this scheme, progenies of 4 plants of two cultures of *Jarila* were tested in pot cultures under controlled conditions of infection. Twenty plants were transplanted in the infected field for further testing.

(c) **Scheme for breeding wilt-resistant cottons in Surat area.**—This scheme was sanctioned by the Committee in August 1936 and commenced work in April 1937. The object of the scheme is to obtain a strain of cotton completely resistant to wilt and suited to the natural conditions obtaining in the Surat tract. This is sought to be achieved either by selection in 1027 A.L.F. or by crossing this cotton with B.D.8 or other wilt-resistant strains.

During the year under report, cultures from the following crosses were tested in the wilt-sick plot at Shera :—

(1) (8-1 × K. F.)

(2) [8-1 (B.D.8 × G.A. 26) × B.D.8) $F_6$1-6] F_5

(3) [I027 A.L.F. (B.D.8 × G.A. 26) × B.D.8) $F_6$1-6] F_5

(4) (8-1 × 1027 A.L.F.) F_9

(5) (Seg. 22-3-2-8× B. C. 1-6) F_5.

The derivatives from Nos. 1, 2 and 5 above were found to combine high resistance with desirable agricultural characters, while the progeny of Nos. 3 and 4 proved to be highly susceptible to wilt. Selected cultures from Segregate 8-1 were tested both at Poona and Shera. The results from the pot-culture

tests at Poona during the past three years are reported to have been so conflicting that it is considered too early to draw conclusions regarding the possibility of selecting a 100% wilt resistant type from Segregate 8-1.

(d) **Scheme for improvement of Wagad cotton at Viramgam and Jagudan.**—While examining the possibility of growing medium and long staple cottons in the short staple areas of India, the Committee, in August 1935, decided that, in view of the absence of any serious attempt to improve the cotton of the large *Dholleras* tract, a comparative study of Indian and Iranian *herbaceum* cottons should be undertaken, with the object of finding out one or more suitable types for the tract. A special officer was deputed to Iran to collect *herbaceum* types of cotton grown there and, in August 1936, a five-year scheme was sanctioned for the improvement of *Wagad* and *Mathio* cottons, the work on *Wagad* cottons being centred at Viramgam and that on *Mathio* at Amreli. The objects are the improvement of *Wagad* cottons for (*a*) quality and yield and (*b*) earliness in order to escape frost, and the replacement, if possible, of the inferior *Mathio* cotton of Kathiawar by early *herbaceum*. These are sought to be achieved by (*a*) selection in Wagad cotton, (*b*) hybridization with Surti-Broach quality cottons like 1027 A.L.F. and B.D.8 and (*c*) hybridization with Iranian *herbaceums* known to be early and of better quality.

The whole of the Wagad area is divided into two main tracts: (*i*) the Viramgam tract, characterised by low rainfall and (*ii*) the Dholka tract with greater and more regular rainfall. The main breeding station is situated at Viramgam and simultaneously a small immune area is being maintained under irrigation at Jagudan to safeguard the work at Viramgam. In July 1941, it was decided to establish another sub-station at Dholka for conducting botanical work on the promising material obtained from Viramgam.

It is reported that during the year, 12 close-boll types were tested against Wagad 8, *Wagotar* and local Wagad in randomised and replicated experiments at Viramgam, Jagudan and Dholka. Six types—W. 87, W. 293, K. 72-2, K. 80-3-B, B. 1-A and (S_1X99X163) 10—which were superior to *Wagotar* in quality and in yield of *kapas* and lint, have been retained for further testing. Trials with four close-boll early types, *viz.*, H. 8-1, E. 31-1, (Ix99) 20—1 and K. 61-3-1, at the three centers of experimentation revealed that, though they mature distinctly earlier than *Wagotar*, maturity is not sufficiently early to escape frost completely. At Dholka, where conditions akin to drought were met with, all the four types were found to be on a par with *Wagotar* in respect

of yield. At the other two places, K. 61-3-1 alone was equal to *Wagotar*, while the rest were significantly inferior to it. This strain is also as good as *Wagotar* in respect of ginning and fibre properties. All the four types have been retained for further trials. Similar trials were carried out at Jagudan, in the Lalio tract, with four open-boll types, *viz.*, Seg. 1-2, Seg. 1-6, Seg. 7-1 and B. 9; the Broach segregates (1-2 and 1-6) were found to be significantly lower than Seg. 7-1 and B. 9 in respect of yield of *kapas*. In view of their failure during the past two years, it is proposed to discontinue these trials.

(e) **Scheme for improvement of cotton crop in Kaira District.**—This scheme was sanctioned by the Committee in August 1939, subject to the condition that it would not come into operation until the Government of Bombay had declared Kaira district as a protected area under the Cotton Transport Act to prevent the import of inferior cotton from Nandurbar. In April 1941, the Government of Bombay issued a notification creating the Mahi-Sabarmati Zone (which includes the whole of the Kaira district) a protected area under the Cotton Transport Act, 1923; the scheme came into operation in September 1941.

Kaira district grows two kinds of cotton, (1) *G. herbaceum* var *frutescens*, popularly known as Kanmi and (2) *G. arboreum* var *typicum* known as *Rozi*, the former is an annual cotton of superior type and is generally grown in black soils, while the latter, which is found as a subordinate crop with cereals in *goradu* soils, is a perennial type, with short coarse staple and 25 to 26% ginning outturn. The area grown under these two cottons is, on an average, 78,000 acres, that under *Rozi* being 10,000 acres. Though the bulk of the cotton grown is the better *kanmi* quality, its reputation has, of late, been spoiled by the admixture of *Rozi* cotton in the gins. The object of the scheme is to find a superior type of cotton by selection or by introduction and trial of other perennial or annual cottons, to replace the *Rozi* type on the *goradu* soils of the Kaira district.

During the year under review, 58 *Rozi* selections were under study, of which 40 were found to be superior in yield and staple characters to bulk *Rozi*. A few were also early maturing and resistant to root rot. As in the past year, the test with two perennial types—Nadams from Madras and Baluchistan *herbaceums* from Viramgam—and two annual types, Co.2 and *Karkhadi*, was repeated, but all of them are reported to have suffered from jassid attack. A selection of 28 plants has been made for testing in the next year.

A seven year rotational-varietal experiment has been undertaken with the object of studying the economics and the possibility of replacing the perennial *Rozi* with the annual Vijaya. The first series was laid out during the year under report. The results showed that of the two cottons, *Rozi* and Vijaya, included in the trial, Vijaya yielded less and suffered, to some extent, from root rot. As, however, its quality was superior to that of *Rozi*, it fetched a better price. Vijaya, with Kodra, gave a higher monetary return than *Rozi* with Kodra.

(f) **Scheme for interspecific hybridization in Cottons at Surat.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years, with the object of obtaining, if possible, fully fertile hybrids between Asiatic and American cottons, combining the useful agronomic characters of both, particularly the good staple length of the American and hardiness and adaptability to Indian climate of the Asiatics. Work on crossing Asiatic and American cottons, begun at Surat in 1932, had already yielded 23 hybrids in which the American parents used were mostly the acclimatised Upland types from different parts of India, while the Asiatic parents were forms of *G. herbaceum* and *G. arboreum*. The hybrids produced from these were, however sterile and efforts to induce fertility in them were successful only when they were back-crossed to American types.

During the year under review, eight families derived from six back-crosses, *viz.*, B. C. No. 22, 68, 125, 134, 170 and 189, were tried in replicated randomised compact family blocks with 1027 A.L.F., and Co.2 as controls. The analysis of the yield data revealed that none of the families was statistically superior to either of the checks; four cultures were, however, on a par with Co.2. In another trial with nine families, the control, 1027 A.L.F., again out-yielded all the selections. Four families from this test were found equal to Co.2 from point of yield. The controls were excelled by a number of families in ginning percentage. One hundred and nine cultures from 17 advanced back-crosses were studied in non-replicated rows with Co.2 as the check and 166 plants possessing the desirable combination of yield and ginning percentage were selected for further trial. It is reported that the F_2 population of the crosses between the tetraploid—(Hexaploid—(American x Asiatic) x*G. armourianum*)—x cultivated American types, showed wide variation in many morphological and economic characters; 104 plants were selected in the field and 29 of them were found to combine ginning outturn above 36% and yield exceeding 5 *tolas*. Their staple length varied from 17 to 26 mm.

Material from the interspecific crosses was supplied to various Cotton Breeders in Bombay, Punjab, Sind, Madras and Indore. Reports of trials, however, do not indicate that encouraging results have been obtained at any of the places. It is claimed that cytological examination of many interspecific hybrids, back-crosses and polyploids has helped to explain some of the causes of sterility and species relationship.

(g) **Scheme for improvement of Dharwar-American Cotton.**—This scheme was sanctioned by the Committee in July 1941 and commenced work in April 1942. The object of the scheme is to improve the Dharwar-American cotton crop grown in the Kannada districts of the Bombay Province, the adjoining areas of the Madras Province and in Hyderabad and Mysore States. This is sought to be achieved by the development, by selection or hybridisation, of an early maturing type, superior to Gadag 1 in respect of yield, staple length and ginning percentage, and which is, at the same time, more resistant to 'red-leaf' blight. The work is being done at Gadag, where conditions of soil, climate, rainfall, etc., are suited to the cultivation of *hirsutum* cottons.

During the year under review, owing to very heavy rains, flowering and harvesting were delayed throughout the tract. As in the previous year, large scale replicated trials with two strains—9766 and 4411—derived from the back-cross (G1 XCo.2)XG1 were carried out; the yield of strain 9766 was on a par with that of the control, G1, but significantly better than that of strain 4411. The two strains maintained their superiority over G1 in respect of ginning percentage. Their lint has been adjudged suitable for spinning 36s and 38s highest standard warp counts respectively, against 34s of Gadag 1. Nine improved exotic types from various provinces and the Indore and Hyderabad States were tested against G1 for yield and other economic characters. Gadag 1, however, surpassed all of them in yield though some of them were distinctly superior to G1 in ginning percentage or staple length. LSS, which was earliest in maturity, has been crossed with G1 and 9766. A few other crosses were also made between G1 and 289F/K.25, 186F, M4, Indore 1, Sind *Sudhar*, Parbhani American, *Buri* 107, Perso-American, Moco, Jinjya and Kampala varieties. Back-crossing the F_1s with G1 and inter-crossing of the various F1s are proposed to be undertaken in the ensuing year.

(h) **Scheme for investigation of 'small leaf' disease of cotton.**—This scheme is an off-shoot of the Mungari Cotton Breeding scheme. It was sanctioned by the Committee in January 1942, for a period of three years and came into operation on the 1st June, 1943. The object of the scheme is to

investigate the causes of "small leaf" disease of cotton, and to determine whether or not the disease is of virus origin. The work is being carried out at Poona. A survey of the disease was undertaken during the year in the provinces of Bombay, Madras and the Punjab and the Hyderabad State. The disease was found to be severe in *Rozi* cotton in Kaira district in North Gujerat and in Mungari cotton in Madras Province and Hyderabad State. American cottons in the Bombay Province did not show symptoms of the disease, but, in the Punjab, it was only these that manifested signs of infection. The disease is characterised by extreme stunting of the aerial organs of the plant and sterility is the chief symptom in most cases. The malformation appears to be correlated to root development. Grafting experiments conducted during the year have shown that the disease is of virus origin. There appears to be no indication that the disease is transmitted by the seed. A study of the pathological histology of the diseased plants is under way.

SIND.

(a) Scheme for production of long staple cottons in Sind.—Ever since the opening of the Lloyd Barrage, the question of the establishment of a compact block of long staple cottons in Sind has engaged the attention of the Indian Central Cotton Committee. Although attempts in the introduction of long staple quality cottons in Sind in the past have not met with the success it was anticipated they would, the project, nevertheless, is considered to have possibilities which are well worth investigating. Accordingly, a five year scheme for cotton-breeding investigations for the production of long staple cottons has been launched. The scheme came into operation in April 1940. The experimental stations are situated at Mirpurkhas and Oderolal. The most important problem to be tackled is to see whether high quality cottons, preferably of the American types, but possessing a better staple than Sind *Sudhar*, can be produced. The aim is to evolve a cotton longer than 1-1/16" which would spin about 60 counts and give a high acre cash value of *kapas* relative to the commercial cotton crops now being grown in Sind. This is sought to be achieved by selecting extra long staple Upland types from a wide range of places all over the world, and, after testing them under Sind conditions, hybridising the best of them with the hardiest Upland types of cotton, such as Sind *Sudhar* and M-4, now grown on a commercial scale in Sind.

As a result of the replicated tests with 200 hybrid progenies belonging to the direct F_3, and Back-Cross generation of the 1943-44 season conducted

during the year under review, about 30 progenies combining yield, staple and ginning have been obtained. Though all the long staple exotic parents used in the cross have been extremely susceptible to Red-Leaf, *Tirak*, very poor in yield and had transmitted these undesirable characters into the hybrid progenies to an alarming degree, by careful selection it has been possible to obtain a few healthy high yielding progenies which do not differ significantly from the Sind *Sudhar* and M4 controls in yield. In addition to retaining the potentialities for the yield of the commercial cottons now grown in Sind, these progenies possess an extra staple length of 1/8 inch. The mean values of the progenies and the co-efficient of variability within each progeny, assure the possibility of further improvement in yield, staple and ginning by responding to further selection which is in progress. The scheme has so far worked successfully and the material on hand holds out definite promise of ultimately producing strains fulfilling the objects of the scheme.

(b) **Scheme for Cotton Jassid Investigation.**—In Sind, jassid attack is most prevalent in the south-east Tharparkar district where it is proposed to establish a compact block of long staple cotton. One of the harmful effects of this pest is improper development of the seed, so that, in certain seasons, good seed is not available for sowing purposes, and this gives a setback to the extension of improved varieties. Accordingly, in August 1937, the Committee sanctioned the above scheme, for a period of three years and six months, with the object of studying the habits of jassids, their alternative hosts and the manner in which certain varieties of cotton resist jassid attack. In January 1941, the scheme was extended up to 18th April 1945. In July 1943, however, the Committee decided that the scheme in its present form should be wound up forthwith, as it was considered that there was very little prospect of any results of practical value emerging from it. The scheme accordingly terminated on the 29th August, 1943. The progress made during the period under review is described below :—

The observations on the relative infestation of jassids on 6 varieties of cotton, *viz.*, Sind *Sudhar*, M4, L.S.S, S.L.D.$_1$, Co.4, K. 25, tested in the varietal trial, showed that jassid population was lowest in M.4 and S.L.D. 1, whilst K.25 and Sind *Sudhar* harboured the largest numbers ; L.S.S., and Co.4 occupied an intermediate position. The seasonal sowings in April, May and June with M.-4 and Sind *Sudhar* indicated that late sowing in June encouraged jassid attack and gave poorer yield than either the April or May

sown crops. The study of the influence of the cultural practices like manuring, watering, spacing, drilling *versus* broadcasting the seed, on the density of jassid population had not yielded results of any value. In the experiment designed to study the correlation between jassid abundance and hairiness, it was observed that except in the case of 4F. 98 and N.T.38, there was a tendency for the more hairy types to be more resistant to jassids.

(c) **Scheme for Co-ordination of Research on Black-headed Cricket in Sind and Baluchistan.**—The scheme for investigation into the black-headed cricket in Sind was sanctioned by the Committee in January 1938, for a period of three years, with the object of establishing the identity of the pest and studying its life history, seasonal behaviour and the extent of the damage caused by it. Before the opening of the Lloyd Barrage, the black-headed Cricket had been known as an occasional pest of *Sorghum* and cotton in Upper Sind and some parts of the Punjab. With the introduction of cotton cultivation on the Right Bank of the Indus, however, this insect has become a serious pest of cotton in the seedling stage in Khirtar and Johi tracts in Sind and in some parts of Baluchistan. The pest appears in the cotton fields towards the end of April and disappears in June. The period of its activity synchronises with the sowing time of cottons and causes almost wholesale destruction of the crop. The pest appears to belong to the same species as met with in Baluchistan, *viz.*, *Gryllulus domesticus*. Since April 1941, the scheme has been merged in the scheme for co-ordination of research on black-headed Cricket in Sind and Baluchistan.

The objects of the co-ordinated scheme are (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures and (3) to control and prevent the ravages of the pest by means of poison baits.

The Baluchistan part of the above scheme has been dealt with elsewhere.

During the year under review, attention was concentrated on testing the efficacy of various poison baits and on the improvement of the standard established, *viz.*, sodium fluosilicate, molasses, rice bran and water mixed in the proportion of 1 : 1 : 20 : 12-1/2. The efficacy of this standard mixture was found to improve when bran with more flour and less of rough husk was mixed with it, the lower grades of bran making it less attractive. Trials were undertaken with rice bran, saw dust, jowar *kadby*, each separately mixed

with molasses, also soaked cotton seed and cowdung ; these showed that the attractive power of jowar *kadbi* and molasses mixture was more than that of the others. Soaked cotton seed, however, proved to be the most preferred food. The efficacy of the standard bait was proved in a laboratory test when it was scattered on young and adult seedlings, the pest preferring the bait to the seedlings, thus proving its utility as a bait for field scale trial. Tests with attractants, like fruit juices and amyl acetate, when added to the standard bait in different quantities, did not give any conclusive results. A few drops of orange juice added to the standard bait are said to enhance its attractive power ; the addition of salt also made it a superior attractant but these results need confirmation. With a view to finding out which early maturing variety could be sown late, sowings were done in March and April, after the pest had subsided, for comparing their behaviour and yield with late sowings, but the experiment proved a failure due to the closure of the canals over a long period. Four varieties sown late gave very poor yields, thus indicating that late sowing is not likely to prove helpful.

(d) Scheme for bollworm investigation and clean-up campaign in Sind.— This scheme was sanctioned by the Committee in January 1940, for a period of 3-1/2 years, and it came into operation on the 1st September, 1940. The work proposed to be carried out under the scheme during the first seven months was (*a*) to survey the host plants during the off-season of cotton and (*b*) to test the efficacy of the implements evolved elsewhere. During the remaining period, it is proposed to carry out a clean-up campaign and to study its effect on succeeding year's crop. The investigations are confined to the Tharparkar district.

The campaign area was increased during the year under review to 1,200 square miles, against 700 sq. miles in the previous year. The clean-up operations, undertaken in the beginning of December 1943, were completed by the 15th March, 1944, during which period, 99% of the area was cleaned. The eradication of *patiteer* and other alternative host plants was also completed within the same time. The study of the effects of the ' clean up ' campaign on the incidence of the boll-worm on the new cotton crop showed that the pest was practically absent from cotton seedlings in the cleaned area during May to July 1943, but fairly active in the uncleaned area. During August to November 1943, the boll-worm population was 2 to 3 times higher in the untreated than in the treated area. The night caging experiments were

done on the same lines as in the past year. There was not much difference in the yield obtained from caged and uncaged plants in the cleaned area but in the uncleaned area the difference was marked. A comparison of the total number of bolls picked from the uncaged plants in each of the areas showed that plants in the cleaned area gave seven more bolls per plant than those in the uncleaned area. It is reported that the increased yield from over 93,000 acres, cleaned up during 1942-43, was some 1,39,500 maunds and that the additional profit to the cultivators who adopted these measures amounted to about 28 lakhs of rupees.

PUNJAB.

(a) **Punjab Botanical Scheme.**—This is one of the earliest schemes of the Committee. Sanctioned in 1923 for a period of five years, it came into operation in August 1925, and has been extended from time to time, the last extension, which will expire on the 28th February, 1945, being approved by the Committee at its meeting held in January 1940. Until 31st March, 1936, the entire cost of the scheme was borne by the Committee, but since then, the expenditure is shared on a 50 : 50 basis between the Committee and the Provincial Government. The original object of the scheme was to investigate the causes of the periodic failures of American cotton in the Canal Colonies of the Punjab where a large area is annually grown under such cottons, and to obtain suitable types of American and *desi* cottons. In view, however, of the immediate economic importance of improved types of cotton, work was concentrated on breeding, and a separate physiological scheme was sanctioned for investigating the problem of periodic failures of American cotton. The Botanical scheme has thus been concerned mainly with the improvement of both *desi* and American cottons. As more than half the cotton area in the Punjab lies in the Canal Colonies, attention was first directed to the improvement of the cottons of that area. The South-Westerns tract of the Province, comprising the arid districts of Multan, Muzaffargarh and Dera Ghazi Khan, were given attention next and a sub-station for this purpose was opened at Multan in 1935.

During the year under review, the total area under cotton in British Districts was 2,620,000 acres, of which 1,850,000 acres were under American and 770,000 acres under *desi* varieties. Medium and long stapled American varieties thus constituted 70.6% of the total Punjab cotton crop. Large scale tests with new selections from 289F/43 and L.S.S. were conducted during

the year under review; the results indicated that the selections from 289F/43, while retaining the good qualities of the parent type, possess 3 to 4% higher ginning outturn. Of the selections from L.S.S., four proved earlier in ripening, superior in ginning and significantly higher in yield than L.S.S. It is expected that, through further testing of these promising cultures, it will be possible to select strains with the desirable combination of characters, suitable for the various areas. The examination of jassid resistance and other economic characters of the 43, F_4 families of the cross (920 Cambodia $\times$58F)$\times$289F/43 and 13 families of (920 Cambodia$\times$58F)$\times$124F, showed that several families are completely immune to jassid infestation, besides possessing a much finer quality of lint than any of the varieties grown in the Punjab. These are stated to constitute a valuable asset, not only for controverting the jassid menace but also for evolving new types with superior technological properties. Crosses have been made, with the same object, between Punjab-American types and Co.3 and Co.4, but these are still in their early stages. Hybridisation of Punjab-American with some of the reputed long linted types was undertaken during the year with the object of producing a strain capable of replacing the varieties now being imported from South Africa and other countries.

The improvement of the lint qualities of *desi* cottons is sought to be effected by crossing Jubilee and Mollisoni with the wild Nigerian cotton—*G. anomalum* and the high quality South Indian *arboreums*.

Extensive trials with the new promising strains, 124F and 199F, were carried out on the Departmental farms and estates of big *zamindars* in Multan district. The results obtained confirmed the previous finding that 124F is the most suitable variety for the entire South-western tract. It has already covered an area of 60,000 acres in the districts of Multan and Montgomery, entirely on its own merits. Type 199F was seriously affected, owing to heavy attack of white fly during the year. It is, nevertheless, considered a promising strain combining high ginning, long lint and good yield with extraordinary jassid resistance.

At the Jhang sub-station, 244F and 268F gave significantly higher yield than 4F and have been retained for further study.

At Hansi, the centre of the South-eastern tract, the performance of the new *desi* strain, 231 Rosea, has been consistently satisfactory during the last two years. Owing to its superiority over Mollisoni $60A_2$, the present *desi*

cotton of the South-eastern tract, both in respect of yield and ginning outturn, it is said to fulfil the requirements of the tract. As a result of the work done at this sub-station, it has been found possible to grow American cottons most successfully in some of the irrigated areas of the tract, which hitherto were considered suitable for the cultivation of *desi* cottons only. One variety of American cotton, 216F, has not only proved to be a higher yielder than Mollisoni $60A_2$ during the past two years, but it also possesses the quality of very early maturity, owing to which it is expected to withstand the droughty conditions obtaining in the tract.

(b) **Scheme for improvement of Punjab-American 289F/K. 25 Cotton.**— This scheme was sanctioned in January 1938, for a period of five years and commenced work from the 9th July, 1938. The object of the scheme is the improvement of 289F/K.25 cotton which was evolved at the B.C.G.A. Farm some years ago. Though this strain is very popular in the Lower Bari Doab Canal Colony and the area under it has expanded very rapidly, it suffers from the defect of susceptibility to jassid attack. One of the aims of the present scheme, therefore, is to develop jassid-resistant strains from this cotton.

During the year under review, owing to the incidence of severe white fly attack and the prevalence of *tirak*, the average yield of 289F/K. 25 on the British Cotton Growing Association Farm was only 8.5 maunds per acre, against 16.17 maunds in 1942-43. The performance of the strain, 124F, is said to have been very promising under Khanewal conditions. On the British Cotton Growing Association Farm, its yield averaged 9 mds. 18 seers per acre, compared with 8 maunds 20 seers of 289F/K.25.

Two hundred and ninety-one single plant selections were tested in progeny rows against three controls, *viz.*, 289F/K.25, 289F/K.25 mass selection and 124F; 52 cultures which gave statistically significant yields were retained for further study. Of these, 18 sibs, which are derived from the cross between 289F/K.25 and 289F/43 are said to be densely hairy and likely to prove highly jassid resistant.

In the varietal trials at Khanewal, some of the reselections from 289F/K.25 and derivatives from 289F/K.25×289F/43 proved to be superior to the parent strains in respect of yield, ginning outturn and jassid resistance; it is expected that the promising material now in hand will yield suitable types, thus fulfilling the object of the scheme.

(c) **Physiological Scheme.**—Partial failures of the American cotton crop in the Punjab occurred in the years 1919 to 1921, 1926 to 1928, 1931 and 1932. The external symptoms of the cotton plants during these failures were early reddening and shedding of the leaves, premature opening of the bolls with immature seeds and low quality lint and, in extreme cases, the dwarfing of the plants. To account for these failures, various views were advanced, such as the heat stroke theory (Milne, 1924), attack of White Fly (Roberts, 1929) and unfavourable combination of climatic and biotic factors (Trought, 1931). As, however, these theories could not be supported by sufficient data, it was thought that the failures might be due to malnutrition of the plant and a physiological scheme was accordingly started by the Committee in March 1935, to study the physiology of the cotton plant with a view to determining, if possible, the nature of the nutritional disorder, its causes and the measures necessary to combat it. The scheme started work in 1935. In March 1937, the Empire Cotton Growing Corporation loaned the service of Dr. Mason to the Committee to inspect and report on the scheme, and, on his recommendation, a soil survey on a large scale was undertaken to connect up soil conditions with cotton failure. The scheme terminated in March, 1944.

The work done so far has indicated that two sets of soil conditions are associated with the development of '*tirak*' *viz.*, (i) soils with saline sub-soil and (ii) soils with nitrogen deficiency. These conditions may exist separately in separate fields or together, the intensity varying from field to field.

The growth of plants is normal in the earlier stages of development on both the soil types. From the flowering stage the plants on light sandy soils deficient in nitrogen are characterised by yellowing and reddening of leaves followed by premature defoliation. The leaves of the plants on soils with saline subsoil exhibit drooping from the middle of August onwards. Wilting becomes more and more accentuated with the advance of time after every irrigation. The leaves do not turn yellow before they are shed.

The association of a chemical substance giving tannin reaction with the deficiency of nitrogen is another important finding which serves as a biochemical index of nitrogen starvation. By subjecting the water-extract of a few bits of cotton leaves to 'tannin test' in August, it is now possible to forestall whether the cotton crop in a particular field requires application of nitrogenous manure or not. If the 'tannin test' is positive nitrogen application will prevent the development of 'tirak' on light sandy lands.

Extra water at the fruiting stage has been found to ameliorate ' tirak ' and give increased yield only on soils which are saline in the subsoil. Additional water supply will not, however, have any appreciable beneficial effect on light sandy soils where ' tirak ' is caused by nitrogen deficiency. Similarly applications of manure will ameliorate ' tirak ' on light sandy soils but not on soils possessing saline subsoil. In order to obviate the difficulty experienced in distinguishing the soil types and deciding upon the correct remedy, a common ameliorative measure for the two abnormal conditions has been devised. It consists in delaying the sowing of cotton in general. The optimum period for sowing American cotton has been indicated to be in the month of June rather than in May. There was a substantial improvement in the opening of bolls in respect of late sowings irrespective of the soil types.

When sowings were done in June, the number of bolls per plant was reduced, affecting the yields adversely even though ' tirak ' was ameliorated. This disadvantage that accompanies late sowings is counteracted by sowing the rows at 2 ft. instead of at 3 ft. and by reducing the distance between plant to plant. This practice would increase the number of plants per acre and a reduction in boll number per acre will be avoided.

June sowings do not suffer from a decrease in yield on normal fertile lands which are neither deficient in nitrogen nor are saline in the subsoil. Thus June sowings can be practised as a general measure to combat ' tirak ' in spite of the great heterogeneity of Punjab soils.

Arising out of the work done in the Punjab under this scheme and in view of the desirability of investigating the applicability of the results achieved under it to other areas, the Committee, at its meeting in January 1944, sanctioned a new scheme for Cotton Physiological Research with headquarters at Indore. Under this scheme, it is proposed to commence work in three cotton tracts, *viz.*, (1) irrigated (2) partially irrigated and partially rainfed and (3) totally rainfed. The province of Sind will receive special attention as the problems to be tackled there are almost similar to those in the Punjab, though the climatic and soil conditions are different. The aim will be to find out the fundamental facts and then attempt to apply the knowledge gained into practice for improving the quality and quantity of cotton in general.

During the year under review, the optimum sowing time for the Sea Island variety of cotton in the Punjab was found to be quite different from that found for the American types. The experiments conducted in 1942-43

season showed that the highest yield of about 10 maunds per acre was obtained in March-April sowings; later sowings gave low and negligible yields. This result was again confirmed during 1943-44. Though the yield obtained was 9 maunds per acre, it was evident that the vegetative growth was high and bearing proportionately low. Early formed flowers and bolls were also shed. The crop matured in December though planted early. In order to overcome these disadvantages pruning was resorted to and the main stems and the branches were topped early in the month of August. This led to immediate development of fruiting branches, the bolls began to set and by the middle of October the crop was ready for the first picking. The unpruned plants had no ripened bolls by that time. This work is being continued in the current season.

The June-sowings of the Punjab American cottons on rice reclaimed lands was found to be superior to May sowings Thus late sowings were also found to be doing well on rice reclaimed lands. It was, however, found that such lands required very heavy manuring. A crop like gram did not replenish the nitrogen lost by leaching when rice was grown and heavy and frequent irrigations were given to wash the salts down. Application of the sulphate of ammonia gave very increased yields, while the control plots showed symptoms of nitrogen deficiency.

As the sulphate of ammonia was not available at present or it was available at prohibitive cost, the manurial value of oil cakes to cotton on light sandy soils was investigated. In all the experiments Toria cake was found to be the best manure, next only to sulphate of ammonia; cotton cake, however, did not produce any visible effect. The experiments are being repeated.

The finding that a thick sown June-crop suffered much less damage from Jassids than a thin sown June-crop was again confirmed for the third year in succession.

The manner in which potash deficiency occurred in 'tirak' affected plants in two different soil types, *i.e.*, soils with saline subsoils and on light sandy soils, has been determined.

Investigations were undertaken during the year in Sind to determine the causes of 'tirak' in Sind-American cottons also to see if the same remedial measures for 'tirak' found successful for the Punjab-American cottons would prove effective for *tirak* in the Sind-American cottons. Attempt was made

to determine the optimum sowing periods for different commonly cultivated varieties of cottons in different parts of Sind and to ascertain whether late sowing would be a common ameliorative measure for 'tirak.'

The investigations carried out in Sind showed that 'tirak' occurred on the same two types of soils, *viz.*, (1) soils with saline subsoils and (2) light sandy soils as were found to be associated with 'tirak' in the Punjab. Both the soil types were found to be widely distributed in Sind. The soils with saline subsoils varied from heavy sandy loams to light sandy types.

Factorial experiments were laid out to study the effect on 'tirak' of (1) late sowings on both the soil types, (2) the applications of the sulphate of ammonia to light sandy soils and (3) applications of extra irrigations in the fruiting period to saline subsoils. 'Tirak' was found without exception to be ameliorated by late sowings on all soil types. It was found to be a common ameliorative measure for 'tirak' for all the Sind American cottons grown in the Central and Southern tracts. Sind *Sudhar* was found to be more susceptible to 'tirak' than M.4 on saline subsoils. Extra irrigations to saline subsoils and applications of the sulphate of ammonia to light sandy soils also proved effective on the respective soil types.

The results of yields obtained in the same experiments indicated that in addition to amelioration of 'tirak' yields can also be substantially increased by late sowings provided closer spacing of plants than normal, *viz.*, 3 feet between rows was adopted. Highest yields in the southern tracts were obtained in crops sown about the middle of May and in the Central tracts in crops sown towards the end of June and beginning of July.

The optimum sowing periods both from the point of view of 'tirak' and yields appeared to be different from the general sowing periods for cottons that are in vogue at present in Sind. In the southern tracts cotton sowings are completed by the end of April and May-sowings are considered to be bad. The results obtained, however, indicated that the month of May is the optimum sowing period. Similarly in the Central tracts of Sind the optimum sowing period was found to be later by one month than the general practice. This difference in the optimum sowing time as determined by experiments and that as at present prevalent in Sind may be due to the introduction of closer spacing in the late sown crops. If the above findings are again confirmed during the next cotton season 1944-45, the whole practice of cotton sowings in Sind will have to be changed as is being done in the Punjab.

Preliminary investigations on the Red Leaf disease in Sind have shown that the reddening of the leaves in Sind-Americans occurs in two ways. In one case, the change in colour is from green to yellow and then to red; in the second case the change is directly from green to red without the intervening stage of yellowing. The first type of reddening occurs on light sandy soils while the second type is confined to heavy sandy loams. Yellowing is a symptom of nitrogen deficiency, while, reddening of the leaves appears to be associated with a seasonal factor. Thus yellowing of leaves may not be followed by reddening when the second factor is not operating.

Experimental evidence supported the above conclusions. On light sandy soils the plots manured with the sulphate of ammonia showed much less or no yellowing and reddening of the leaves while it occurred in the control plots. Similarly late sown plots suffered much less or not at all from this trouble than the plots sown early, as the former did not suffer from a deficiency of nitrogen. The lower leaves showed yellowing while the younger leaves were green.

Preliminary investigations were also carried with *hirsutum* cotton grown in Central India.

(*d*) **Cotton Jassid Investigation in the Punjab.**—This scheme is concerned with the study of the Jassid insect in the Punjab, as regards its habits, alternative host plants and characters of the cotton plant which determine resistance to the pest.

It is reported that jassid attack during the year under report was severe and that the observations on the resistance of varieties indicated that 124F was the most susceptible and the three selections from 289F/43, *viz.*, 233F, 234F and 238 F the most highly resistant. In an experiment designed to study the influence of agronomic factors on jassid population, it was found that wide spacing, late sowing and increase in the number of irrigations resulted in an increase in the population of the pest. Among the morphological characters, the dominant ones which determined the intensity of the attack were toughness of the leaf-veins and density of hairiness of the leaves. It is stated that toughness of the veins has been found to be positively correlated with hairiness and negatively with jassid population. In a late sown crop, the leaves of the plant tended to become succulent and develop fewer hairs than in an early sown crop; this is said to explain why late sowings suffer from severe infestation. The study of the effect of selenium on the mortality of jassid

showed that even a minimum dose of 4 lbs. per acre, added to the soil prior to sowing, proved fatal to the pest. *Bhindi*, *Hibiscus mutabilis*, hollyhock, luffa, tomato and *gurhal* were found to be the most favoured hosts of the pest. The collection of jassids by the use of light traps showed that large numbers were attracted during the period—mid-June to mid-September-; no jassids were entrapped after the 17th November.

CENTRAL PROVINCES AND BERAR.

Central Provinces and Berar Cotton Breeding Scheme.—The Central Provinces and Berar Cotton Breeding Scheme was sanctioned by the Commitee for a period of five years with effect from the 1st April, 1939, and replaced the Central Provinces Botanical Scheme which terminated on the 31st March, 1939. The object of this scheme is to evolve, by selection or hybridisation, suitable new strains of cotton which can compete successfully with the local *Oomras* in point of ginning outturn and yield and which, at the same time, possess a staple capable of spinning between 20s and 25s highest standard warp counts. The scheme is worked at Nagpur and at Akola, to suit the special requirements of the Central Provinces and Berar, respectively.

The Central Provinces Cotton Breeding Scheme is concerned with the breeding of improved strains of cotton suitable for Nagpur, Wardha, Chanda and parts of Chhindwara districts and capable of replacing the ordinary short staple mixed cotton of these areas. The scheme at Akola is concerned with the production of high-yielding superior strains of cotton suitable for the Berars and possessing a staple of at least $\frac{3}{4}$", with the softness, colour and strength of V. 434 and a ginning percentage above 33. Breeding of high ginning new strains of *Buri* cotton for the Burhanpur *tahsil* also forms part of this scheme.

It is stated that V. 434 was grown during the year over an area of 5,32,564 acres in the Central Provinces and Berar, against 6,61,904 acres in 1942-43. The area under *Jarila* was 1,348, 304 acres, compared with 1,368,048 in 1942-43; *Buri* 107 occupied some 45,000 acres in the Burhanpur *tahsil*. Yield trials were carried out with H. 415, H. 420, V. 434, *Jarila* and local *Jadi* in a number of representative localities in the Central Provinces and Berar; the results showed that, in the Central Provinces, H. 415 was more promising than the others. *Jarila* is stated to have proved a poor yielder; in Berar, however, in the majority of the trials, *Jarila* was found to be leading. As regards

quality of lint, the new strains—H. 420 and H. 415—are stated to have been found capable of spinning 32s and 27s highest standard warp counts, respectively, against 30s of V. 434 and *Jarila*. It is now proposed to undertake extensive trials in a number of localities in the Central Provinces and Berar to finally decide whether H. 420 should be given out for distribution.

In the preliminary yield test carried out with seven American cottons, the differences in yield due to varieties were insignificant. Judging, however, from the comparative yields and ginning percentage of the types, the new strain B. 103-927 is considered promising. *Buri* 107, which is very popular in the Burhanpur *tahsil*, is said to have spread to certain parts of Berar also. Its average yield per acre on the Akola farm was 711 lbs. and its lint is adjudged suitable for spinning 38s H. S. W.C. against 36s of *Buri* 103.

MADRAS.

(a) **Pempheres Scheme.**—This scheme as originally sanctioned and started in 1931 consisted of two investigations, one for the cotton stem weevil (*Pempherulus affinis*), and the other for the evolution of a strain in *Karunganni* cotton, resistant to the harmful effects of February rains. The second investigation was terminated in 1938, as the experimental work had been brought to a stage when further work could be continued by the Agricultural Department itself. The problem of the control of the cotton stem weevil was pursued in three directions, botanical, biochemical and entomological. In 1938, when the work was reviewed, it was felt that the latter two aspects could be stopped and the former one, *i.e.*, the botanical aspect, could be pursued as indications were obtained to the effect that quicker and more tangible results could be secured by concentrating attention on the breeding side. The scheme terminated on the 30th April, 1943.

The most important result of the work done on the scheme is the isolation of four biotypes, *viz.*, X 102-2-4, X 108-4-1, X 82-1-5 and I-37-1-2, with lower mortality and higher yields than the standard strain Co.2. Their defects, however, are a coarser lint and a longer maturity period by one week than Co.2. Work to remedy these has been undertaken by the Provincial Department of Agriculture.

(b) **Scheme for Improvement of Mungari Cotton in Madras Province.**—

This scheme was sanctioned by the Committee in 1937 and has for its object the evolution of strains suitable to the red soils and combining the quality of

the *Westerns* with the yield of *Mungari*, to replace the inferior *Mungari*, the existence of which affords opportunities for mixing, with the result that the better cottons of the tract fail to get their proper value. On the black soils of Anantapur, Bellary and Kurnool districts of the Madras Province, cottons commercially known as *Westerns* and *Northerns* are grown. These are medium staple varieties, capable of spinning 24s to 32s. The type of cotton grown on the red and mixed soils, on the other hand, is that known by the name of *Mungari*, which is a coarse, short staple variety, similar to *Bengals*, and not fit to spin more than 8s or 10s. The co-existence of these widely different varieties in the same tract favours undesirable mixing, with the result that the better cottons suffer in value. It is to overcome this difficulty that the Mungari scheme was started.

During the year under review, yield trials were conducted with 25 strains, 8 of which were from the previous year's tests, and 17 new selections, in replicated randomised blocks on red and light black soil areas at Adoni. Of these, 7 strains, *viz.*, V. 434, 6042, 883, 1595, 1585, 881F and 1127C, were on a par in respect of yield with the local *Mungari* on both types of soil. They possessed good staple and were high ginners but, with the exception of V.434, they were all late maturing and, therefore, were not considered suitable for the *Mungari* area. H.1, which equalled the local in respect of yield in the late sowings of the previous year, failed to keep up this level when planted early.

District trials were carried out at 9 centres in three districts—Anantapur, Bellary and Kurnool; *Jarila* and P. 710 were found to be the best and most consistent in their behaviour. It is stated that examination of the previous yield data from varietal trials on cultivators' fields indicated that among the early medium staple types, V. 434, P. 710 and *Jarila* were as good as the short staple local; the American varieties were generally good in this respect in Anantapur and Kurnool districts. Dharwar-American was cultivated on fairly extensive areas of red soil in Anantapur district. Umri-Bani-believed to be G.6—has been observed to be spreading in the *Mungari* area of Kurnool district. It is proposed to confine further village trials to early maturing types like P. 710, *Jarila*, Umri-Bani and selected American types.

Of the 355 hybrid cultures tested in progeny row tests, 4 sibs derived from crosses involving P. 26H, P. 710, *Jarila* and M. 274 were found to combine yield, medium staple, high ginning and early maturing habit.

A study of varietal resistance to stenosis in all available *arboreum* and *herbaceum* cottons revealed that only two varieties—G. 4M. 11 and G. 9—were consistently high yielding and resistant to the disease. The cultivation of V. 434 and Co.4 as a mixed crop is stated to have had no effect on the incidence of stenosis, while there was progressive reduction in yield with the increase in the proportion of the American component, Co.4. In another experiment, the effects of spacing and time of sowing on the yield, incidence of stenosis and earliness were studied. The results showed that stenosis was not influenced by the time of sowing, but the yield was significantly lowered in late sowings. Further trial with cucumber belt as a measure of control against the red hairy caterpillar indicated that it can be used as a trap crop.

(c) **Scheme for Improvement of Cocanadas cotton in Madras Province.**—This scheme was sanctioned by the Committee in November 1938, for a period of five years. The work was started from 1st February, 1940. The object of the scheme is to improve the yield and ginning percentage of Cocanadas cotton, preserving at the same time the light pinkish colour of its lint owing to which it is in great demand for the manufacture of dyed yarns.

As the Cocanadas cotton is cultivated on both black and red soils, arrangements were made to sow the seed material at two places, *viz.*, at Narasaraopet to represent the red soils, and at the Agricultural Research Station, Guntur, for black soils.

Colour improvement being one of the objectives of the scheme, greater attention was paid to investigate the limits of variation in the different standard lint colour grades. Seeds of plants representing five standard grades were sown in six agricultural research stations. When the *kapas* of each plant was analysed, it was observed that grades 2 and 3 were not different from one another. Grades 4 and 5 were likewise similar. All the above four grades showed dilution in colour, the dilution being greater at Coimbatore than at other places. It was further noticed that the colour was not influenced by the time of sowing and that wide variations were present in the colour of the lint produced on the same plant even after removing the effect of exposure. Studies of the effect of exposure showed that all grades except No. 1 deepened in colour within certain limits peculiar to each grade. It was clear from the observations that the standard grades needed regrouping based on the ranges of variation in each, and that the upper limit of improvement of lint colour in Cocanadas cotton by the method of single plant selection could only be

grade 3. Further intensification in colour is possible only by crossing it with imported varieties. It is stated that amongst the Asiatic cottons the highest grade of lint recorded so far was 5, while in the Americans the depth reached grade 7. Arrangements were made to cross the standard strain in the Cocanadas variety, *viz.*, ×20 with higher grades up to 5. Besides, a Cambodia strain having lint of grade 1 was crossed with cottons of grade 6 and 7 with the object of evolving a type of American cotton suited to the red soils of the tract. The studies also indicated that it would be necessary to determine whether the lint colour standards used by the trade were the result of genetic or environmental factors. Such a clarification would be necessary since, in case the former set of factors was found responsible for deeper colour, it will not be possible to combine lint length and colour owing to the negative correlation existing between them.

During the year under report, 178 cultures comprising selections from various bulks and derivatives from intervarietal crosses, possessing colour grade 3, were tried in replicated row tests, using × 20 as control. Twenty one progenies recorded yields significantly better than the control, but, of these, only ten combined the desirable economic characters. Four promising selections carried forward from the previous season, *viz.*, 123, 129, 805 and 1626, were compared against ×20 and local bulk in large plots at Narasaraopet and Gurzala. Selection 805 appeared to be the best.

It was found that coloured types were generally coarser and less strong than the white selections. In the preliminary tests conducted at the Committee's Technological Laboratory, Matunga, with two direct dyes, no relationship between depth of colour and dye-absorption could be found.

The improved strain ×20 is reported suitable for cultivation in the Red Rajamundry and Red Northerns Zones but not in the Chinnapatti area.

New crosses were made to synthesise colour and staple and their first generation was raised at Srivilliputtur to effect a saving of time.

UNITED PROVINCES.

The United Provinces Botanical Scheme.—This scheme was sanctioned by the Committee in 1938. The object of the scheme is (1) to develop improved strains of *Bengals* cottons, for the rain-fed and irrigated tracts of the United Provinces, from the material collected in the course of the survey of cottons in Rohilkhand and Bundelkhand, (2) to test the suitability of the

United Provinces improved cottons—C.402, C.520 and Perso-American—against local and other promising introductions, both on Government farms and cultivators' fields, and (3) to investigate the possibilities of American cottons under the United Provinces conditions. The scheme terminated on 31st March, 1944.

The area under cotton in the United Provinces, during the year under review, was 363,932 acres against 311,486 acres in 1942-43 and the total production was 1,10,000 bales compared with 92,000 bales last year.

During the year, seven strains, including A and D isolated from the original survey collections were compared with C. 520/2 (a sub-strain of C. 520) and four survey strains with C. 520 as control, both under irrigated and unirrigated conditions, at a number of Government farms in the province. The results at five unirrigated centres have shown that strain D has given the highest yield followed by C. 520/2, thus confirming the superiority of this strain over the others for the fifth year in succession. The results at eight irrigated centres have shown that C. 520/2 was highest in respect of yield, followed by C. 520 and D.

In the preliminary and bulk trials, most of the survey strains tested compared favourably with C.520 in yield and quality; strains 35/1 and 35/3 were outstanding at all the research stations.

In the experiments for comparing the performance of the Punjab-American cottons, *viz.*, 100F, LSS, 83F, 289F, N15 and Perso-American with C. 520 at seven centres in the province, it was observed that the difference in yield amongst the strains was significant at all the centres. 100F out-yielded significantly all other American types at Raya and Meerut, and LSS at Kalai. At Cawnpore, while LSS did not differ significantly from Perso-American and 289F, it gave a significantly better yield than all the remaining American cottons and C. 520. At Belatal, under rain-fed conditions, strains B_2 and B_7—selections from Perso-American—were found significantly superior to the parent strain, Perso-American, B_2 recording a yield of 738 lbs. against 400 lbs. of the control.

BENGAL.

(a) **Scheme for cultivation of long staple cotton in Bengal.**—The object of this scheme is to test the possibilities of introducing long staple cottons in the well drained highland soils of Bengal. It is financed jointly on a 50:50 basis, by the Provincial Government and the Bengal Millowners' Association

and it came into operation in April 1938. In January 1941, the Indian Central Cotton Committee agreed to provide a supervising officer for the scheme for a period of two years. In addition to supervising cotton cultivation work at the different centres, the officer will also undertake botanical work.

During the year under report, the season is stated to have been very unfavourable for cotton. Varietal yield tests and sowing-date-cum-spacing experiments were laid both at the Dacca and Midnapur Farms besides in two more centres ; thus there were five centres in all, one in the district of Dacca, one in Rangpur, two in Murshidabad and one in Nadia. The experiments in the district farms proved a failure. At Dacca they were practically washed away by the heavy July-August rains, and, at Midnapur labour difficulties and abnormally dry weather conditions during the bolling period made the result very poor. Of the five centres, the one in the Dacca district met the same fate as the experiments in the Dacca farm, conditions being more or less identical in the two places. The centres in the Rangpur and the Nadia districts again maintained their record of high yield. The yields at the two centres in the Murshidabad district were not unsatisfactory. Of the varieties, Dacca Parbhani, Dacca *Buri* and Dacca Kampala proved to be better than the rest. On an average about 740 lbs. of seed cotton per acre have been obtained in some places.

BALUCHISTAN.

Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan.—The scheme for the control of Black-headed Cricket in Baluchistan was originally sanctioned in August 1939, for a period of two years, to run concurrently and in co-ordination with the scheme for investigation into the Black-headed Cricket in Sind sanctioned by the Committee in January 1938. The combined scheme for the co-ordination of work in progress in Sind and Baluchistan was sanctioned in January 1941, for a period of three years from the 1st April, 1941. In January 1944, the scheme was extended for a further period of one year from the 1st April, 1944. The objects of the scheme are : (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures, and (3) to control and prevent the pest by means of poison-baits.

The control work in Baluchistan consisted in preventing the migration of the pest from the strip of land known as " Pat ." along the Khirtar canal by destroying the insects at the canal bridges.

During the year under review, the control work in the Usta *tehsil* in Baluchistan was carried out on the lines of previous years. The authorities of the Kalat State have for the first time undertaken control measures against the pest in their area. Owing partly to floods and partly to the control operations in Kachhi area, there was a decrease in the population of the migrating crickets.

HYDERABAD.

(a) **Botanical Research Scheme.**—The object of this scheme, which was sanctioned by the Committee in 1929, is to study the several varieties of cotton grown in Hyderabad and to secure from them high ginning medium staple types, to replace the existing varieties in the different parts of the State. A large number of improved pure strains has been evolved under the scheme, amongst which *Gaorani* 6 is the most outstanding. The scheme was extended in July 1938, for a further period of five years from the 1st April, 1939.

The headquarters of the scheme were transferred during the year to the new Cotton Research Station at Nanded. The work in connection with the production of wilt-resistant types of *Gaorani* is, however, being continued at Parbhani, as part of the newly sanctioned scheme for the improvement of *Oomras* cotton.

During the year under report, varietal trials were conducted at Nanded, Madhol and Latur with three or four improved *Gaorani* strains against local and *Gaorani* 6 as controls. *Gaorani* 6-E-3 proved to be superior in respect of lint yield, spinning capacity and acre cash value at the first two places. *Gaorani* 12F-2 is reported to be a good all-round type for the Latur area. 262 single plant selections were tested at the 3 centres mentioned above and 30 promising cultures have been retained for further study. Of these, 4 progenies which are derivatives of G. 4M-11 are said to be particularly encouraging owing to their early maturing habit. District trials were conducted with 3 or 4 improved varieties at 25 places in the *Gaorani* and Tellingana areas. The trials at 2 places in each of these areas proved failures. The results at the remaining 21 centres indicated that G. 6E-3 and G. 12F-2 are suited to the northern and southern sections of the *Gaorani* area. The results

of the trials in Telingana area were not conclusive. As a result of the various agronomic experiments conducted during the year, it was observed that none of the variations from the local practice in regard to the frequency and timings of the preparatory tillage and post sowing operations brought about an increase in yield. The effects of weeding were significant and plots weeded twice gave a significantly higher yield than those weeded once. In the manurial experiments, a dose of 20 lbs. of N per acre was found to be sufficient to improve the yield of cotton. Advantage of an additional dose was considered doubtful. Ammonium sulphate was found to be an efficient source of nitrogen only for well-drained light soils. For heavy black cotton soils, groundnut cake was considered more useful, its cheapness was also a factor in its favour.

(b) Scheme for improvement of cotton of Oomras tract in Hyderabad State.—This scheme was sanctioned by the Committee in August 1940, for a period of five years, and it came into operation on the 8th October, 1941. The object of the scheme is to improve the cotton of the '*Oomras*' tract of the State. This is sought to be achieved.

(1) by the production of an early maturing and high ginning strain of *Gaorani* 12F, for the eastern half of Parbhani District and Hadgaon *taluka* of Nanded district,

(2) by the production of an early maturing and high ginning strain of Parbhani-American, for the *Ghat* area of Aurangabad District,

(3) by evolving a wilt resistant strain from G. 16C, by crossing it with New Million Dollar, for the western half of Parbhani District and part of Bhir District,

(4) by breeding a high ginning, quick maturing, wilt and drought resistant variety capable of spinning 12-16s highest standard warp counts, for the southern half of Aurangabad District.

During the year under review, *Gaorani* 12F2 maintained its performance of the previous year in respect of earliness, spinning capacity and wilt-resistance. In the district trials, this variety was found to be superior to the two controls, local and *Jarila*, as regards yield of seed cotton at Jalna and Pimpalwadi, but equal to them in this respect at Parbhani. It is considered that this strain would be ideal for the *Oomras* tract, if its ginning outturn were improved. Efforts to remedy this defect are in progress. *Indicum* 17 is another promising strain combining high yield and high ginning outturn with wilt-resistance. In the preliminary wilt experiments, some 749 selec-

tions were tested in single rows in the wilt-sick plots. Thirteen progenies showed no deaths, 26 had a mortality ranging from 1 to 5% and 66 from 5 to 10% against 40 to 85% and 33 to 95% in the case of the respective controls. Of the 13 progenies mentioned above, 2 were derived from parents which recorded nil mortality in the previous year. Fifty-six wilt-resistant strains were tested for yield in wilt free soil against Parbhani local, *Gaorani* 16C and *Jarila*. Of these, seven strains gave significantly higher yields than all the three controls. A sib of *Gaorani* 4, *viz.*, II-41-6634, is reported to combine a high degree of wilt-resistance with significant yield during the past two seasons. During the year, Parbhani American, was cultivated over an area of 9,600 acres in the *ghat* area of Aurangabad district, the total production being some 910 bales. This fetched a premium of O.S. Rs. 10-8 per *palla* of 120 seers over local *Jarila* at Aurangabad. The extra income derived by the growers of this variety is said to have amounted to Rs. 19,215. Amongst the new strains, L-II-40-591, L-II-40-593, L-II-40-594 and L-II-38-255-41, which were mentioned as being promising last year, have maintained their qualities of earliness, high ginning and good yield both at Parbhani and Sillod in the *ghat* area.

The work in connection with the production of wilt resistant types of *Gaorani* was carried out as in previous years at Poona under the Cotton Wilt Breeding Scheme from the material available at Parbhani. Out of the five promising wilt-resistant *Gaorani* strains reported last year, three did well during the season. In the preliminary test conducted on fresh *Gaorani* material, two strains are reported to have shown a high degree of resistance.

(c) Scheme for improvement of Kumpta cotton.—This scheme was sanctioned for a period of five years and it came into operation in November 1937. The object of the scheme is to develop certain strains of *Kumpta* cotton bred from the local variety of Raichur which, in the preliminary tests conducted at the Government Experimental Farm, Raichur, prior to the starting of the scheme, had given better yields of both seed-cotton and lint than either the local variety or improved *Jayawant*. After two years' work, the strain Raichur-*Kumpta* 15 was selected for further development. It was sown in 1939-40 on an area of about 40 acres in a cultivator's field, and an average yield of 293 lbs. of seed cotton per acre was obtained. Though this yield was a good deal better than the average of the local variety in the adjoining fields, the Committee, at its meeting held in August 1940, suggested that this

strain should not be distributed on account of its susceptibility to wilt, and that strain R.K. 19 should be tested instead and attempts made at once to produce a wilt-resistant Kumpta type.

The cotton crop at Raichur and Hunsihalhuda during the year was satisfactory. Three Raichur *Kumpta* strains, *viz.*, R.K.19, R.K.25 and R. II-38-673, a new *Kumpta* selection, were tested against Hagari and the local; the new strain gave significantly better yield than the other types. The wilt test conducted at Hunsihalhuda showed that all the new *Kumpta* strains of the R. II series were significantly superior to the controls—R.K.25 and local—in respect of wilt resistance. Of the 660 single plants tested in the wilt-sick plots at the same place, 34 resistant and high yielding progenies have beeen retained for further study. In the district trial at Karatgi, R.K.19 is stated to have given the same yield as Hagari and local *Jayawant* used as checks.

None of the *Kumpta* progenies tested for wilt resistance at Poona were promising.

BARODA.

(a) **Root Rot Scheme.**—This scheme, which has for its object the study of the root rot disease of cotton in Baroda and the production of strains resistant to it, has been in operation since February 1932. The scheme terminated on the 31st May, 1943.

No positive results of value have come out of the investigation. The testing for resistance, of a large number of varieties, both imported and indigenous, showed that the cotton selections obtained from the village *Karkhadi* were the only promising cultures resistant to root rot under field conditions. The *Karkhadi* selections, however, though distinctly less susceptible than Broach 9, gave a spinning performance of only about 10s, against 24s of B.9. The failure to obtain a 100% resistant strain of *Karkhadi* is attributed to the difficulty in sifting the truly resistant from the escapes in the infested plots, where mortality occurred in patches. Progenies of *Karkhadi* cultures grown in glass-house did not prove to be any better than the field selections.

(b) **Scheme for improvement of Mathio cotton at Amreli.**—This scheme has for its object the improvement of *Mathio* mixture in respect of yield, ginning percentage and quality and the trial at Amreli of the early strains

of Wagâd evolved at Viramgam with a view to replacing, if possible, inferior *Mathio* by early *herbaceums*. The scheme came into operation in June 1937.

During the year under review, varietal trials were conducted with four types—S. 20-2-12, S. 21-2, S. 24-2 and S. 31—at Amreli and with the last three types at four other centres in Kathiawar, *viz.*, Ingorala, Damnagar, Palitana and Jamnagar. C. 520 and local *Mathio* were introduced as controls. None of the types gave significantly better yield than the controls. S. 24-2 and S. 31 are, however, considered worthy of further trial as they spin 18s and 34s highest standard warp counts against 13s and 14s of *Mathio* and C. 520, respectively. The performance of S. 31 has been consistently good during the past two years and it is stated that the Baroda Department of Agriculture has decided to multiply its seed over an area of 12 acres next year under the name of 'Pratap.' Nineteen families, 3 selected from *Mathio* and 16 derived from the F3 progenies of two crosses—S.5 × *Jarila* and S. 6 × *Jarila*—were tested against local *Mathio* and C. 520 in a replicated progeny trial; besides S. 31 and S. 24-2, six other families appeared to have combined good yield with desirable economic characters and these have, therefore, been retained for further study. S. 31 and C. 520 were crossed, during the year, with the object of transferring the hardiness of the latter to the former.

BIKANER.

Bengals Cotton Improvement Scheme.—The opening of the Gang Canal under the Sutlej Valley Scheme resulted in the colonization of a new and virgin area, known as the Gang Canal area, with immigrant peasants, mostly from the Punjab, who were accustomed to the cultivation of the Punjab *desi* and American types of cotton. These cultivators found it difficult to successfully cultivate cotton under local conditions, evidently because the new environment was not quite the same as they were accustomed to in the Punjab. This scheme was, therefore, started in January 1931, for the purpose of studying the local problems of the agriculturist and for obtaining by selection and hybridization one or more superior types of cotton suitable to the locality. The poor stand of the cotton crop under the Ganganagar conditions was reported to be due to (1) poor germination of seed and (2) mortality of the plants at all stages of growth due, chiefly, to whiteant attack. Until 1934, the botanical work was confined to the testing out of a large number of outside varieties, both *desi* and American. After that year, however, extensive survey of the Rajputana tract was undertaken to collect

breeding material, at the same time, extensive trials of the few selected cottons from outside were continued to test their suitability to the tract. Agronomic work was pursued intensively from the beginning of the scheme. At the end of the first five years, it was found that C. 520 was the most profitable cotton to grow in the tract and that the American cottons were generally unsuitable because of their low yield and susceptibility to disease. Also the staple of Punjab-American cottons was found to deteriorate both in length and strength when grown under Ganganagar conditions. A large amount of data and useful information regarding sowing times, seed rate, frequency and distribution of irrigation, optimum spacing for the *desi* and American cottons, rotation and manuring have been collected. Since 1934, greater attention has been paid to selection and breeding problems. The scheme terminated on the 31st March, 1944.

Arrangements have been made for the multiplication of the seed of R. 18 (re-named Ganganagar 1), a new *desi* strain, evolved under the scheme. This variety is similar to W. 520 (the *desi* strain originally recommended for the colony) in quality, but has 4 to 5% higher ginning percentage and 10% higher yield. Amongst the American varieties tried, 199F was found to be outstanding in respect of lint yield. Owing to its superiority in ginning outturn, it gave 100 lbs. more lint than 289F/43, the type recommended for the tract. It is stated that 199F should prove a good substitute for 289F/43 for the colony if its performance continues to be as good as obtained in the trials conducted so far.

MYSORE.

Mysore (Doddahathi) Cotton Scheme.—This scheme, which was sanctioned in 1935, is concerned with the breeding, from the local *Doddahathi* or American cotton, of suitable types, resistant to "red leaf" disease which stands in the way of the expansion of this crop in the Irwin Canal area in Mysore State.

During the year under report, the new Mysore-American varieties, M. A. V. to M. A. IX, were tested in a varietal-seasonal trial against Co.4 at the Irwin Canal, Babbur and Hebbal farms. Owing to unfavourable seasonal conditions, the yields obtained at Hebbal were low. The sowings at the Irwin Canal farm were done in the months of January, February, March and April and those at the Babbur Farm, in the months of July and August. At the Irwin Canal farm M.A.V. gave the highest yields for the February and March sowings and M.A. IX and Co.4 for the January and April sowings, respectively.

At the Babbur farm, M.A.VI not only gave higher yield but also matured earlier by 1 to 2 weeks than the other strains under trial. A similar varietal-seasonal trial was undertaken at the Irwin Canal farm with five varieties of Egyptians, *viz.*, Giza 7, Giza 12, Sakel, Marrad and Ashmoni. For these cottons, October-February appeared to be the most favourable period for sowing in this tract. Giza 7 and Giza 12 were found to be better than the others. On the Babbur farm, the manurial and seasonal trials with Giza 7 and Giza 12, indicated that sowings done during July and August, with groundnut cake applied at four different periods of plant growth, are the best. Preliminary trials of S . I. V. 136 showed that the October-February sowings produce healthy vigorous plants giving better yields than sowings in other months. Spacing wider than 2-1/2′×3′ was not found advantageous under Mysore conditions. Further study on the X-ray treated material was continued. It was observed that only two selections in Co. 1267, three in Co.3 and two in M.A. II possess a staple of 1 to 2 mm. more than the controls. M.A. IX (irradiated Co.2), which has been found to combine drought resistance, high yield and long lint, is expected to replace M.A. II in Banavar and parts of Davangere.

During the season pure seed of M.A. V was distributed to cover an area of 45 acres in the Irwin Canal tract, 30 acres in Banawar area and 25 acres in Chitaldrug area. In addition, pure seed of M.A. VI, sufficient to cover an area of 6 acres, was distributed in the Babbur area of the Chitaldrug district.

CHAPTER V.

SEED DISTRIBUTION AND EXTENSION SCHEMES.

From the point of view of the grower, special significance attaches to the Seed Distribution and Extension Schemes of the Committee, as they form the real link between the Experiment Station and the cultivator. The total amount so far spent by the Committee on such schemes amounts to some Rs. 16 lakhs. During the period under review, there were twenty one seed distribution and extension schemes in operation in the various cotton growing provinces and States ; a brief report on the working of these schemes is given below :—

BOMBAY.

(a) **Surat Seed Distribution Scheme.**—This scheme was first sanctioned in November 1929 for a period of two years. In December 1931, it was extended for another two years, pending the final decision of the Committee on the cotton policy to be adopted in the Surat area. In January 1934, after a thorough examination of the relative merits of 1A and 1027 A.L.F., the Committee decided in favour of the latter and extended the scheme for five years for the distribution of 1027 A.L.F. seed in the Surat area. In November 1938, the scheme was extended for a further period of one year, in August 1939, for three years, and again in July 1942, for a period of two years from the 1st April, 1943.

During the year under review, the Agricultural Department controlled a seed multiplication area of 21,307 acres of pure 1027 A.L.F. (including 686 acres grown with farm pedigree seed) against 30,731 acres (including 757 acres grown with farm pedigree seed) last year. An area of 15,131 acres under *Suyog* (Seg. 8-1) was also controlled. It is reported that as *Suyog* seed found favour with the grower in Surat District, the demand for 1027 A.L.F. seed declined. The Agricultural Department handled 10,33,972 lbs. of seed, of which 7,10,515 lbs. were distributed in British areas and 3,23,457 lbs. supplied to States, the corresponding figures for the previous year being 16,37,476 lbs., of which 11,86,636 lbs. were distributed in British areas and 4,50,840 lbs. in the States.

The Scheme for grading and marking of 1027 A.L.F. was in operation during the year under review; the Agmark labels were given to 1027 A.L.F.

and *Suyog* cottons of guaranteed purity. 240 bales of Agmark (red label) and 6,925 bales of Agmark (black label) of 1027 A.L.F. cotton and 105 bales of Agmark (red label) and 5,075 bales of Agmark (black label) of *Suyog* cotton were pressed and disposed of at premiums varying from Rs. 6 to Rs. 26 for 1027 A.L.F. and from Rs. 4-8 to Rs. 25 for *Suyog*. The corresponding premiums obtained last year for these cottons were from Rs. 10 to Rs. 25 and Rs. 13 to Rs. 20 respectively.

(b) **Scheme for selection 1A Cotton.**—This scheme was sanctioned in November 1938, for a period of three years, subject to the condition that it should come into operation only if and after the Government of Bombay had isolated Olpad and part of Chorasi Taluka, and that it should continue only so long as this area was effectively isolated. On the fulfilment of this condition, the scheme came into operation in February 1940. In July 1942, it was extended for a further period of two years and two months. The objects of the scheme are (1) to confine the growth of 1A, as far as possible, to Olpad Taluka, by restricting the movement of cotton and cotton seed out of that area and by making provision for pure seed of Selection 1A for cultivation within the Taluka area, and (2) to check the cultivation of 1A in the rest of the Surat area by arranging for the distribution of adequate quantities of pure seed of 1027 A.L.F. and by intensive propaganda against Selection 1A.

During the year under review, four check stations (including one permanent) were established on the Tapti River from 10th February, 1944, to prevent illicit import of cotton by road from Olpad to Surat protected area. Ginned cotton, however, was allowed to be transported, under licence, to Surat for being pressed and marked ' Olpad ' before sale, this work being supervised by the Cotton Assistant, Surat. 13, 926 half-pressed bales were allowed to be imported into Surat under licence and were pressed into 23,272 full pressed bales.

An analysis of the prices obtained for 1027 A.L.F. and Selection 1A showed that pure 1027 A.L.F. realised Rs. 15 over local Surti and Rs. 14 over Selection 1A marked ' Olpad.' The position of 1027 A.L.F. is reported to be in no way better than it was in previous years. With the introduction of the improved strain ' *Suyog* ', which combines the good qualities of both 1A and 1027 A.L.F., the opposition of the Co-operative Cotton Sale Societies has disappeared and they are reported to have purchased the seed of the new strain for sowing in the coming season. As the question of the comparative merits of the two varieties 1A and 1027 A.L.F., has ceased to be a problem with the introduction of ' *Suyog* ', further continuance of the scheme is considered unnecessary.

(c) **Jarila Seed Distribution and Extension Scheme.**—This Scheme was sanctioned in March 1937, for a period of ten months in the first instance. It was extended in January 1938, for a period of one year, in November 1938, for three years and again in July 1941, for a further period of five years. Its original object was to replace Banilla in the Khandesh tract with *Jarila*, which is wilt resistant, over an area of some 1,55,000 acres. In view, however, of the general suitability of *Jarila* for the Khandesh area, the expansion now aimed at is 8,00,000 acres, out of a total cotton area of 11,00,000.

The scheme is operated in five stages of which the first two are the Government Farms at Jalgaon and Bhadgaon. The seed produced at the Jalgaon Farm is used for further multiplication in the wilt affected regions, and that at Bhadgaon Farm for the wilt free zone of Khandesh. In January 1943, the Committee approved of the proposal to close down the seed farm at Bhadgaon and to transfer the seed multiplication work being done there to the Jalgaon Farm and the Mamurabad village adjoining it.

Stages I and II.—The selfed seed from the previous year was sown on an area of 32 acres on the farm and gave 10,000 lbs. of seed for multiplication in stage II during 1944-45. The quantity of seed produced from about 111 acres of tenants' holdings at Mamurabad (near Jalgaon farm) was 27,460 lbs. which was handed over to the Cotton Superintendent, Jalgaon, for further multiplication. All the cotton under the two stages was ginned in the farm gin and the lint sold by open bidding at Jalgaon; it fetched Rs. 212 per *boja*, *i.e.*, Rs. 480 per candy F.O.R. Bombay, against the Bombay *Jarila* quotation of Rs. 486 per candy on that day.

Stages III and IV.—During the year under report, 65,56,940 lbs. of *Jarila* seed were distributed by the Department and approved stockists over a controlled area of 3,80,079 acres (including a reserved area of 1,04,463 acres). This falls short of the stipulated area of 3,92,000 acres by 11,921 acres and is attributed to (1) the "Grow More Food Crops Campaign" and (2) stock of about 5000 bags of seed remaining unsold. The total area under *Jarila* cotton (including natural spread) is estimated at 8,38,548 acres against 7,71,339 acres last year.

The growers who sold their produce in the village markets realised on an average Rs. 14-7-0 per *maund*. The auctions organised by the Co-operative Societies during the year were not as successful as before, on account of absence of transport facilities, seasonal inferior quality and lower demand.

They, however, sold, during the year, 2,149 bales of *Jarila* at prices varying from Rs. 372 to Rs. 480 per *candy* against the Bombay price of Rs. 438 to Rs. 487. On an average, *Jarila* is stated to have fetched Rs. 4-10-0 more per *maund* of *kapas* than the local. The gross extra income realised by cultivators of *Jarila* is eatimated at Rs. 1,11,10,761.

For sowing in 1944-45, the Agricultural Department and approved stockists have stocked 81,00,820 lbs. of seed, sufficient to cover 450,000 acres.

The Bombay Government have applied the Cotton Control Act to the East Khandesh district from 1st April, 1944, and have fixed *Jarila* as the prescribed variety for the tract. Arrangements are stated to be in progress for the application of the Act to West Khandesh district (excluding Taloda, Nandurbar and Nawapur *talukas*) and to the *talukas* of Baglan, Nandgaon, Malegaon, Yeola and Kalwan of the Nasik district. Further arrangements are also in progress to carry out a survey of the areas to which the Cotton Control Act has been applied, to establish check stations under the Cotton Transport Act and to prohibit imports of cotton except under a licence.

(d) Deccan Canals (Jarila) Seed Distribution Scheme.—This scheme was sanctioned in January 1934, for a period of five years and came into operation in April 1934. In August 1939, a further extension for five years was sanctioned. At the same time the venue of seed multiplication was also changed from Kopergaon and organised on new lines in Baramati tract.

The original object of the scheme was to distribute seed of Banilla to enhance general cotton yields and to improve the quality of the cotton in the Deccan Canals tract in the Poona, Sholapur and Ahmednagar districts. In view, however, of the susceptibility of Banilla to the wilt disease, the Committee at its meeting held in January 1942 approved of the proposal to replace Banilla by *Jarila*, which gives a bigger return per acre and is, at the same time, capable of resisting wilt to a great extent.

During the year under report, the scheme was kept in abeyance as irrigation under Deccan Canals was being regulated with a view to encouraging the cultivation of food crops and to discourage the growing of cotton.

(e) B. D. 8 Seed Distribution Scheme.—This scheme is concerned with (1) the marketing of pure B. D.8 cotton in order to secure a price commensurate with its quality, (2) the multiplication of pure seed for further extension and (3) propaganda work for increasing the production of pure B. D.8. It was sanctioned in August 1935, for a period of three years and came into

operation in December 1935 ; in July 1938, it was extended for a period of five years. The scheme terminated on the 30th November, 1943.

During the eight years that the scheme was in operation, the area under B.D. 8 fluctuated widely from year to year, depending upon the premium realised during the previous year. The table below shows the acreage covered and the premium obtained for this variety for the years 1935 to 1943 :—

Year.	Area under B. D. 8 in acres.	No. of F. P. bales of B. D. 8.	Base April/May.	Premium realised over Broach Local per candy.
			Rs.	Rs.
1935-36	3024	615	180 to 210	37 to 53
1936-37	20012	4500	226 to 250	37 to 52
1937-38	6268*	2035	160 to 170	45 to 54
1938-39	14294	3254	148 to 155	43 to 52
1939-40	30951@	5374	240 to 275	43 to 52
1940-41	9728†	691	189 to 240	85 to 132
1941-42	13178‡	1491	150 to 220	95 to 120
1942-43	27339‖	1871	440 to 640 +	145 to 225

* Owing to difficulty in sale of seed-cotton and adverse weather condition, area dropped under B. D. 8.

@ Includes 12,715 acres controlled by the Department. † Includes, 4,156 acres controlled by the Department. The premium obtained during 1939-40 was very inadequate and hence fall in area.

‡ Includes 6,280 acres controlled by the Department.

‖ Includes 5,747 acres controlled by the Department. The premium obtained for B. D. 8 cotton was most encouraging due to high demand for staple cotton and hence the increase in area.

\+ Indian Cotton Contract.

Although B.D.8 possesses fine staple and is highly wilt resistant, it is not favoured by gin-owners, chiefly because of its poor ginning capacity compared with the local. In spite of its better quality, consumers in Bombay purchased B. D. 8 at the prevailing rates for Broach Local and the cultivator thus was not compensated for the 7% lower lint outturn of this cotton. These factors have necessitated its replacement by '*Vijaya*' (Segregates 1-2 and 1-6) which is said to combine all the desirable economic characters, such as, high ginning percentage, good yield, superior ginning capacity and wilt resistance. The new scheme for multiplication and distribution of *Vijaya* cotton seed in Middle Gujerat was put into operation on the 1st December, 1943.

(f) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme.— This scheme, which was sanctioned in August 1935, for a period of five years, replaced five seed schemes in the Southern Division of the Bombay Province, *viz.*, the Hubli, Gadag, Athani, Haveri and Bailhongal schemes. It came into operation on the 1st June, 1936 ; in August 1940, it was extended for a period

of one year and again in July 1941, for a further period of four years from 1st June, 1942.

The original object of the scheme was to eliminate local mixtures and to extend pure *Jayawant* and Gadag No. 1 in the Southern Division of the Bombay Province, over an area of 9-1/2 lakhs acres, within a period of five years. During the extension period of the scheme, it is proposed—

(1) to cover an additional area of 425,000 acres with *Jayawant* and 75,000 acres with Gadag No. 1 ;

(2) to carry on intensive propaganda for the cultivation of improved cottons and to check the growing of inferior types ;

(3) to have *Jayawant* and Gadag No. 1 pressed under departmental supervision and marketed under ' Agmark ' ;

(4) to make seed distribution work self-supporting by gradually reducing the subsidy on cotton distributed, until, by the 31st May, 1944, it is eliminated ; and

(5) to entrust the work of the scheme to efficient co-operative organisations, provided the working of the scheme is not adversely affected.

The scheme is operated from eleven centres for *Jayawant, viz.*, Dharwar, Hubli, Nargund, Haveri, Bailhongal, Gokak, Athani, Bagalkot, Hungund, Bijapur and Muddebihal, and from two centres for Gadag No. 1, *viz.*, Gadag and Ron. Decentralisation is the key-note of the scheme, the idea being that no single agency should have too big an area to cover or too great a responsibility to shoulder.

During the year under report, the Department organised an area of 111,200 acres of *Jayawant* and 29,600 acres of Gadag No. 1, of which 103,274 acres and 28,475 acres, respectively, were rogued. 36,742 bags of *Jayawant* seed and 11,254 bags of Gadag No. 1 seed were distributed to cover 518,500 acres and 118,600 acres, respectively. The area under natural spread is estimated at 134,700 acres and 35,000 acres under *Jayawant* and Gadag No. 1 respectively, thus bringing the total area under *Jayawant* to 653,200 acres, and that under Gadag No. 1 to 153,600 acres.

It is stated that 26.,272 *docras* of *Jayawant* and 13,217 *docras* of Gadag No. 1 were sold in auction at a premium of Rs. 12 per bag of 1,344 lbs. for *Jayawant* and of Rs. 16 for Gadag No. 1 over the *bazar* rate.

For sowing in the next season, 68,965 bags of *Jayawant* and 18,720 bags of Gadag No. 1 are proposed to be stocked; up to 31st May, 1944, 25,805 and 8,000 bags, respectively, of the two varieties were purchased for the purpose.

It is stated that since the consumers of cotton did not appear to appreciate the value of Agmarked bales for one reason or other, Agmark work was done voluntarily. Up to the end of May 1944, only 1,643 bales of *Jayawant* cotton were pressed under Agmark. The view is expressed that unless the mill-owners appreciate the value of Agmarking and are prepared to pay adequate prices for Agmarked bales, the Agmarking of cotton would not become popular.

(g) Scheme for cultivation of 1027 A. L. F. Cotton in Nawapur Taluka.— This scheme was sanctioned by the Committee in January 1942, for a period of three yeas. It came into operation on the 4th May, 1942. The object of the scheme is to bring an area of 25,000 acres in Nawapur taluka under 1027 A.L.F. cotton.

During the year under report, 180,291 lbs. of seed of 1027 A.L.F. were distributed over an area of 14,000 acres, including a certified area of 3,277 acres. The produce was pooled and marketed by public auction at Rs. 10 per *bhar* of seed cotton over local. The growers of 1027 A.L.F. are reported to have realised a gross extra income of Rs. 1,02,375 at Rs. 7-5-0 more per acre over the local.

(h) Scheme for multiplication and distribution of "Vijaya" cotton in Middle Gujerat.—This scheme was sanctioned by the Committee in July 1943, for a period of five years and it came into operation on the 1st December, 1943.

The object of the scheme is to completely replace local Broach and B. D. 8 cottons by *Vijaya* cotton over an area of 5 lakhs acres in the Nerbudda-Mahi and the Mahi-Sabarmati zones of middle Gujerat.

The Agricultural Department, during the year under review, controlled a seed multiplication area of 15,257 acres (including 571 acres grown with farm pedigree seed). Out of a total quantity of 13,28,376 lbs. of *Vijaya* seed handled, 12,40,776 lbs. were distributed in British tracts and 87,600 supplied to Indian States. Owing to a serious fire accident at the Nabiput ginning centre in April 1944, 62,000 lbs. of seed under stages II and III were destroyed

and this is expected to result in a reduction in area in the coming year under stages III and IV of about 1,500 and 6,300 acres, respectively. 7,883 bales were pressed from the produce of the controlled area of which 7,358 bales were sold at Rs. 5 to Rs. 60 'off' the May Indian Cotton Contract quotation and 401 bales at a premium of Rs. 10 over *Jarila*.

(i) **Scheme for multiplication and distribution of "Wagotar" cotton in Ahmedabad district.**—This scheme was sanctioned by the Committee in July 1943, for a period of three years and 4 months. It came into operation on the 1st December, 1943.

The object of the scheme is to organise the multiplication of *Wagotar* cotton seed so as to extend this cotton over an area of 2 lakhs acres in the Wagad tract of the Ahmedabad district comprising the talukas of Viramgam, Sanand, Dholka and Dhanduka, where at present local Wagad mixture and Wagad 8 are grown.

During the year under review, 6,063 lbs of seed were distributed around four major centres in the district to cover an area of 772 acres under stages IV and V. Stages II and III were organised at Jakhvada and Shiyal, in Viramgam taluka, in an area of 10 and 221 acres, respectively. 203 *maunds* of seed of stages IV and V have been purchased by the Department for sowing 6,030 acres in 1944-45.

Agents were appointed for purchasing *Kalas* of stages IV and V in the Dholka, Sanand and Dhanduka talukas and they paid a premium of annas 2 to 3 per 40 lbs. over the prevailing market rate. About 200 *maunds* of *Kalas* of stages IV and V were sold direct by cultivators to other merchants who paid a higher premium.

SIND.

(a) **Seed Distribution and Extension Scheme.**—This scheme was sanctioned in December 1930, for a period of three years and came into operation in April 1931. It was extended in August 1933, for five years from the 1st April, 1934, and in November 1938, a further extension for two years was sanctioned. In August 1940, it was extended for a further period of five years from the 1st April, 1941.

The main objects of the scheme are :—

(*a*) Varietal tests of improved strains—Sind American cottons.

(*b*) Trials of high quality cottons—Egyptians and imported American cottons.

(*c*) Demonstration of cotton cultivation on non-cotton growing areas of new barrage lands.

(*d*) Seed multiplication, distribution and extension work.

(*e*) Propaganda, demostration and advisory work in connection with the extension of improved varieties of cotton and better methods of cultivation.

(*f*) Assistance to cotton growers in marketing cotton.

The work on the Right Bank mainly consists of the extension of cotton cultivation, while on the Left Bank, attention is largely devoted to seed multiplication and distribution of improved varieties of cotton and the introduction of better methods of cultivation.

During the year under review, the total area under cotton in Sind (British districts) was 8,99,365 acres against 7,28,797 acres in the previous year. Owing to the 'Hur' menance and martial law, most of the cultivation was neglected or given up. The area under improved strains comprised 74.4% of the total cotton area, against 67.8% in 1942-43. The short stapled *desi* varieties are reported to have been almost completely replaced.

The new improved American type, M-4, which is superior to Sind *Sudhar* in ginning outturn and yield, is in great demand owing to its suitability for cultivation in all parts of Sind and its early maturing habit, as a result of which, it gives the bulk of its yield in the first picking and escapes bollworm and red-leaf blight attack.

The estimated area and yield per acre of the two principal improved strains in Sind and their relative acre cash values are given below :—

Name of the improved variety.	Estimated area.	Estimated yield per acre.		Estimated acre cash value.
	Acres.	Mds.	Seers.	Rs.
Sind *Sudhar*	4,20,000	9	38	213 15 0 (certified). 208 15 0 (uncertified).
M-4	1,95,000	10	34	230 9 0 (certified) 227 14 0 (uncertified).

The extra gross income to the growers of the above improved varieties is estimated at Rs. 2,01,80,187.

For sowing in 1944-45, 22,600 maunds of Sind *Sudhar* and 49,000 maunds of M-4 were distributed by the Department; the factories sold 25,000 maunds and 75,000 maunds, respectively, of these varieties. In addition, 10,000 maunds of seed of N.R. were also sold by the factories.

(b) Financing of Seed Distribution.—This scheme was sanctioned by the Committee in January 1938, for a period of three years, subject to the condition that it would not be put into operation until the Rules under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, have been brought into force. This condition was fulfilled on 18th April, 1941, and the scheme came into operation in January, 1942.

The object of the scheme is (1) to establish a compact block of improved varieties of long staple cotton in Sind, (2) to make large quantities of pure seed available to the cultivators and (3) to provide an organization for effective distribution of seed even to the remotest corners of the cotton zones.

During the year under report, the areas rogued on the Left and Right Banks under departmental control were as follows :—

	Left Bank.	Right Bank.
	Acres.	Acres.
Sind *Sudhar*	44,600	100
4F-98	....	500
M-4	46,300	466
Sind N. R.	700	..
Total.. ..	91,600	1,066

Owing to the "Grow More Food crops campaign" and the high prices of grain crops, cotton cultivation on the right bank is stated to be declining.

On account of its satisfactory performance under varied conditions, in all parts of the Province, including Nawabshah district where other American types had failed, and its earlier maturation than Sind *Sudhar* by 3 to 4 weeks, as a result of which it escapes boll-worm attack, red leaf blight and damage by early frosts, it is reported that M-4 seed was in great demand

during the year. The quantities of pure seed of the three varieties purchased by the Department for distribution is shown below :—

	Left Bank. Mds.	Right Bank Mds.
Sind *Sudhar*	22,691	300
M-4	49,056	300
4F-98 (A & B classes)	..	2,727
Total ..	71,747	3,327

Ginning and pressing were supervised by the Department and certificates of purity were issued to ginners. Certified full pressed bales fetched a premium of Rs. 2-8-0 to Rs. 3 per *maund* of lint. Growers received from the ginners about 8 annas per *maund* extra premium for certified *kapas*.

The following table shows the standards of purity and soundness of the cotton seed during 1943-44 :—

	Sind *Sudhar*	M-4
Purity	94%	94%
Soundness	87%	91%

A notable feature of the year is reported to be the almost complete disappearance of the area under short-stapled *desi* varieties. Improved Sind-American cottons comprised 80% of the total American crop.

CENTRAL PROVINCES AND BERAR.

(a) **Verum Seed Distribution and Marketing Scheme.**—In November 1929, the Committee sanctioned, for a period of one year in the first instance, the Central Provinces Verum Seed Distribution and Extension Scheme. It started work in September 1930, and was extended annually up to the end of July 1934, when it was combined with the newly sanctioned scheme for the extension of long staple cottons in the Central Provinces. The combined scheme, known as "Scheme for Extension of Long Staple Cotton and Marketing of Verum cotton in the Central Provinces and Berar" was sanctioned for five years from June 1934. At the meeting of the Committee, held in July 1938,

it was extended up to the 31st May, 1941, the title being changed to " Scheme for the Extension and Marketing of V. 434 cotton." In January 1941, a further extension up to 29th February, 1944, was sanctioned. The scheme aims at the extension of area under V. 434 cotton in the seven *taluqs* where Verum has made most headway in the past, the ultimate object being to eliminate all other varieties as far as possible. During the extension period, the objective will be to raise the area in six of the seven *taluqs* (excluding Ellichpur) to 5 lakhs of acres.

During the year under report, the Agricultural Department distributed 29,325 *maunds* of seed through the agency of Government seed stores, *Taluq* Agricultural Associations and seed farmers. An area of 286,460 acres (107,590 acres under Departmental spread and 178,870 by natural spread) was covered against 256,293 acres last year. The falling short of the objective of raising the area under it to 500,000 acres in Berar and Nimar is attributed to the rapid expansion of *Jarila* in Berar and Buri 107 in Nimar. It is reported that, in addition to the above quantity, 16,615 *maunds* of seed were distributed outside the selected *taluqs*. The total amount of seed distributed in the Central Provinces and Berar was thus 45,940 *maunds*. 66,792 *maunds* of seed have been stocked for distribution in the next season.

The number of bales received through the Departmental pool was 12,871, of which 8,392 bales were V.434, the special areas contributing 5,124 bales. The average premium obtained for V.434 was Rs. 31-8-0. The total extra income derived by the growers of V. 434 in the year under report is estimated at about Rs. 63.84 lakhs.

(b) Scheme for Distribution and Marketing of Buri 107 Cotton.—This scheme was sanctioned by the Committee in July 1938, for a period of three years, and came into operation on the 1st March, 1939. In January 1941, it was extended up to the 29th February, 1944. The object of the scheme is to introduce Buri 107—a selection from acclimatised *Gossypium hirsutum* developed under the Central Provinces Botanical Research Scheme—in Burhanpur *Tahsil* of Nimar district, where the total area under cotton is about 75,000 acres. Commencing with an area of 2,000 acres in 1938-39, the programme was to raise the area under this cotton to 10,000 acres in 1939-40 and 30,000 acres in 1940-41. During the extension period, the aim will be to raise the area to 50,000 acres and to maintain it at that figure. The scheme terminated on the 29th February, 1944.

During the year under report, 2,931 *maunds* of seed were distributed by the Department over an area of 17,586 acres. In addition, 1,645 *maunds* of seed, obtained from *kapas* ginned under Departmental supervision were sown over an area of about 9,869 acres, bringing the total area under Departmental spread to 27,455 acres. In all, 45,000 acres were under Buri 107, against 49,409 acres last year. The reduction is attributed to the "Grow More food campaign." A significant achievement of the scheme is that local Buri is now practically non-existent.

The Department purchased 8,066 *maunds* of certifiable Buri 107 seed sufficient to cover the required 50,000 acres in the next year.

The gross extra income to the growers of this cotton during the year is estimated at 2.8 lakhs.

(c) Scheme for distribution and marketing of Jarila cotton in Central Provinces and Berar.—A small scheme for the distribution of *Jarila* seed, sufficient for 1,000 acres each in 17 *tahsils* and for roguing the area thoroughly, was sanctioned by the Committee in January 1943, for a period of one year. It came into operation in September 1943. The present scheme was sanctioned in January 1944, for a period of three years from the 1st March 1944. Its object is to arrange for the distribution of pure seed of *Jarila* in Berar, excluding the Pusad *taluq*, covering an area of two lakhs acres.

During the year under report, a total area of 1,348,304 acres was grown with *Jarila*, of which 53,610 acres were covered with 8,571¼ mds. of pure seed distributed by the Agricultural Department. 23,728 *maunds* of seed of different stages have been stocked for sowing in the ensuing season.

3,570 bales of *Jarila* cotton were pooled, of which 3,473 were sold at a premium of Rs. 35-8-0 per *khandi* over Bomay quotation for *Jarila*.

MADRAS.

(a) Co. 3 Seed Distribution Scheme.—This scheme, which replaced the Madras Co_2 seed distribution scheme, was sanctioned in January 1942, for a period of four years and five months. It came into operation in July 1942. Its object is to improve the present standard of Cambodia cotton in Salem district by replacing the existing Co_1 and Co_2 cotton strains with Co_3.

During the year under report, 2,28,000 lbs. of seed were distributed to cover an area of some 9,280 acres. The area maintained under seed farm conditions by the Agricultural Department and the three Crop Marketing

Societies of Trichengode, Rasipuram and Salem, was 800 acres and 4,500 acres, respectively. It is stated that owing to fall in the price of cotton, many cultivators declined to part with their *kapas* with the result that only 927,800 lbs. of *kapas* were brought to the Co-operative Societies, of which 654,600 lbs. were sold to selected dealers. Out of the 324 *candies* of lint obtained, 230 *candies* were sold at a premium of Rs. 150 per *candy*. Owing to adverse seasonal conditions and low prices, only 440,000 lbs. of seed against 800,000 lbs. originally programmed were available for distribution in 1944-45, the area estimated to be covered being about 22,000 acres.

Premia ranging from Rs. 5 to Rs. 10 per *pothi* (305 lbs.) of *kapas*, over the local were obtained by the seed farm growers ; in addition the cultivators are reported to have benefited to the extent of Rs. 18 per acre from the higher yield of Co.3. The total gain to the growers of Co.3 during the year under report is estimated at Rs. 2,50,000 which works out to Rs. 27 per acre approximately.

(b) Scheme for Distribution of H1 Strain in the Westerns Area.—This scheme, which was sanctioned by the Committee in July 1941, started work in July 1942, in three selected centres, *viz.*, Bellary, Adoni and Guntakal. The object of the scheme is to organise the multiplication and distribution of H. 1 cotton seed over 2,00,000 acres in the 4th year, in the three areas of Adoni, Guntakal and Bellary of the Westerns tract of the Madras Province.

The Agricultural Department maintains an area of 3,000 acres for the multiplication of H. 1 seed and the seed obtained from it is utilised for sowing the outer seed farm area under the scheme. For purposes of large scale production and distribution of pure seed, the tract is divided into three convenient areas with centres at Adoni, Guntakal and Bellary. Under Departmental supervision, the seed-farms in the areas in question are sown, rogued, the produce collected and ginned, and the lint sold through the Co-operative Societies. The cleaned seed obtained from the produce is handed over to the societies for sale. During the year under review, seed farms covering over 15,338 acres were arranged for against 15,000 acres originally programmed for at the three centres. It is stated that owing to unusual rains during the flowering and picking period, the staple was short and weak to an unexpected degree. A total quantity of 690,300 lbs. of seed, sufficient to cover 69,030 acres, has been stocked with the Co-operative Societies for sale. Of the 656 dokras (Dokra=312 lbs.) of lint obtained in Bellary and Adoni

from the seed farm produce, 119 dokras were sold at a premium ranging from Rs. 7 to Rs. 30 per *Nag* of 312 lbs. The Co-operative Marketing Society at Guntakal handled only seed and the lint was handed over to the cultivators to be disposed of by them. In the ensuing season, it is proposed to arrange seed farms of 7,500 acres in each of the three areas.

(c) **Maintenance of Nucleus of pure seed of Improved Varieties of Cotton.**—This scheme was sanctioned by the Committee in January 1938, for a period of five years and came into operation in September 1938. In July 1943 it was extended for a further period of five years for the maintenance of nucleus of the four strains Co.2, Co.4, K1 and N14.

The area selfed and the quantity of selfed seed produced of each variety during the year are given below :—

Name of variety.	Area selfed.	Quantity of selfed seed produced.	How disposed of.
	Acres.	Lbs.	
Co.2	1	465	Sown in multiplication plot of Central Farm.
Co. 4	1	358	Reserved for sowing in inner area of seed farm in Ramnad District.
K. 1	2	553	Reserved for sowing in seed multiplication plot in Agricultural Research Station, Koilpatti.
N.14	1.03	99	Reserved for sowing in seed multiplication plot in Agricultural Research Station, Nandyal.

UNITED PROVINCES.

Scheme for Distribution and Extension and Marketing of Perso-American Cotton in Western United Provinces.—This scheme was sanctioned in January 1942 for a period of four years. The agricultural and marketing part of the scheme came into operation on the 6th May, 1942.

The objects of the scheme are (*i*) to multiply pure seed of Perso-American cotton for large scale distribution and to extend its cultivation over suitable areas in the districts of Aligarh, Bulandshahr and parts of Meerut, Muttra and Etah and (*ii*) to organise the marketing and grading of Perso-American produce through co-operative sale societies and other agencies.

Notwithstanding unfavourable seasonal conditions, the yield of Perso-American, during the year, compared favourably with that of the varieties it is intended to replace. The average yield of Perso-American is estimated at 3 mds. against 2½ mds. of *desi*. The produce obtained from stages III and IV, worth over a lakh of rupees, was purchased by the Agricultural Department at a premium of Re. 1 per *maund* over the market rate. It is stated that the cultivator got Rs. 6 to Rs. 8 per *maund* of *kapas* over *desi* cotton. The quantity of 8,574 *maunds* of seed, secured in the fifth stage, will suffice for an area of 35,000 acres next year.

The Co-operative organisation is reported to have been started during the year. Two hundred and seventy two bales produced from the *kapas* of stages I to IV, purchased by the Department, were sold at a premium of Rs. 80 to Rs. 100 per *candy* over *Jarila*. Perso-American lint fetched Rs. 35 to Rs. 40 per *maund* more than *desi*. The gross extra income to the cultivators is estimated at Rs. 2,77,165 from an area of about 12,000 acres. Of the 750 bales pressed from stage V produce purchased by the Co-operative Societies, 630 were sold at a premium of Rs. 90 to Rs. 100 over *Jarila*. The Co-operative Societies are reported to have made a total profit of over Rs. 50,000 and a bonus of Rs. 1-8-0 to Rs. 2 per *maund* is proposed to be distributed to the growers.

BARODA STATE.

(a) **Baroda (Navsari) Seed Storage Scheme.**—This scheme is concerned with the spread of 1027 A. L. F. over an area of 2,10,000 acres in the Navsari district of the Baroda State. It was sanctiond in February 1933, for a period of five years, subject to the condition that the Baroda Government would arrange a seed multiplication area of 1,000 to 2,000 acres in that district. At the meeting of the Committee in July 1938, the scheme was extended for a period of five years and again in July 1943, for a further period of one year from the 16th April, 1944.

It is reported that the object of the scheme has been achieved since the enforcement of the Cotton Control Act in the district in 1941.

During the year under report, the total area under 1027 A..L. F. was estimated at about 1,65,000 acres, of which the controlled area was 14,112 acres, the corresponding figures for the previous year being 210,000 and 31,655 acres, respectively. An additional area of 3,200 acres, which was sown with Segregate 8-1, was also under Departmental control. The reduction in the area is attributed to the compulsory proportion of food to non-food crops required to be maintained in accordance with the State regulations. The total quantity of seed distributed was 22,66,758 lbs. against 26,56,500 lbs. in the previous year.

Certified cotton from the checked fields was pooled, ginned and baled under Departmental supervision, and given black 'Agmark' labels. The bales produced by the societies and groups from areas which were not of the requisite standard for seed supply were given 'green' labels. The bales from the other areas of the State, which fetched a premium of at least Rs. 5 over local, were given a stencil stamp of "1027 A.L.F. Baroda State Produce." The marketing of Agmark and labelled F.P. bales was done through the Marketing Officer at Surat. The gross extra income received by the cultivators of 1027 A.L.F. and Segregate 8-1 is estimated at Rs. 11,37,056 and Rs. 44,900 respectively. It is stated that Seg. 8-1 is likely to suit Navsari district and prove more profitable to the cultivators than 1027 A.L.F. The State Seed Organisation is considered capable of switching over successfully to Seg. 8-1 from 1027 A.L.F.

To meet the demand for seed in the ensuing year, about 23,10,000 lbs. of seed will be purchased and stored.

(b) **Baroda B. D. 8 Seed Distribution Scheme.**—This scheme, which has for its object the extension of B. D. 8 cotton in Baroda district, was sanctioned in July 1938, for a period of five years and came into operation on the 1st April, 1939. Its object is to popularise B. D. 8 cotton (which is wilt-resistant and superior in quality to the local cottons) over 60,000 acres of the Kahnam black soil area of the Baroda district, north of the river Nerbudda.

During the year under report, 1,824,000 lbs. of B. D.8 seed of standard purity (8,588 lbs. A grade, 130,440 lbs. B grade and 602,520 C grade) were stocked, of which 1,134,640 lbs. were issued to the cultivators over an area of 109,993 acres (780 acres with A grade, 14,500 acres with B grade and 94,713 acres with C grade). In addition, 23,365 lbs. of seed of *Vijaya* and its constituents were distributed to cover 2,007 acres. With a view to providing

seed for the entire district, additional area was examined and 730 acres of A, 14,388 acres of B and 5,882 acres of C grades of B.D.8 and 1,969 acres under *Vijaya*, which came up to the requisite standard of purity, were accepted for seed supply organisation. The premium realised over *Jarila* by the certified B. D. 8 ranged from Rs. 120, at the beginning, to Rs. 20, at the close of the season. The demand for certified B. D. 8 was keen, the average difference between certified and uncertified cotton being Rs. 20 per *bhar*. The steady decline in the prices of B. D. 8 is attributed to less demand for this cotton by the mills, export restrictions, transport difficulties and greater production of cotton than required. The growers of certified B.D.8 and *Vijaya* cotton are reported to have realised an additional income of about Rs. 12,33,360 and Rs. 81,720, respectively. 3,715,200 lbs. of different grades of B.D.8 and *Vijaya* cotton seed have been stocked for sowing over an area of 22,905 acres during the 1944-45 season. In addition, 3,186,560 lbs. of C grade seed of B.D.8 has been stocked to cover an area of 120,000 acres in the attached areas of Baroda State.

During the year under review, owing to the enforcement of the Cotton Control Act in the State, no local cotton was grown in the tract except B.D.8.

The B. D. 8 scheme terminated on the 31st March, 1944, and is now replaced by the new scheme for the multiplication and distribution of *Vijaya* cotton. This is said to be the logical follow up of the corresponding scheme for Gujerat in the Bombay Province sanctioned by the Committee in July 1943. The new scheme, which came into operation on the 1st April, 1944, aims at covering approximately 300,000 acres in Baroda State.

(c) **B. 9 Seed Storage Scheme.**—This scheme was sanctioned in July 1941 for a period of five years. It came into operation on the 1st September, 1942. The object of the scheme is to introduce in the areas of Baroda district, not suited to B.D.8, a cotton superior both in staple and spinning value to the average Broach grown locally.

The Cotton Control Act was applied to Baroda district in April 1943, making the cultivation of B.9 compulsory in Waghodia and Savli talukas. During the year under review, the Department issued 8,48,000 lbs. of seed for sowing over 95,231 acres (2,080 acres of A grade, 15,490 acres of B grade and 77,661 acres of C grade) of which 2,060 acres of A grade and 13,710 acres of B grade were certified as being of the required purity standard.

4,696 *bhars* of seed cotton (700 of A grade and 3,996 of B grade) were pooled at different centres up to the 31st March, 1944. For 1,311 *bhars* of certified cotton, an average of about Rs. 3 more per *bhar* over uncertified cotton was realised, giving an additional income of Rs. 4,381 to certified growers. The gross extra income realised by the growers of B.9 is stated to be Rs. 13,50,000.

44,360 lbs. of A grade seed, sufficient for 4,400 acres, 3,20,680 lbs. of B grade, sufficient for 25,000 acres and 9,45,940 lbs. of C grade, sufficient for 66,000 acres have been stocked for sowing in 1944-45.

As it is intended to cover, if possible, the whole of Sabarmati-Narbudda Zone with *Vijaya*, comparative trials of B. 9 and *Vijaya* were undertaken in the area concerned, but the results were inconclusive. The trials will be re-repeated in the current year.

(d) Scheme for creation of a pure Wagad Zone in Mehsana district in Baroda State.—This scheme was sanctioned by the Committee in January 1943 for a period of two years and it came into operation on the 1st December, 1943.

Its object is to spread Wagad 8—a strain of *herbaceum* cotton developed by the Department of Agriculture, Bombay—in Mehsana district, over an area of one lakh acres. This variety is reported to be a valuable improvement on the ordinary mixed Wagad type of cotton grown in Mehsana. It was selected after several years' trials at Jagudan farm and its subsidiary district testing areas under farmers' conditions.

During the period under review, the total area rogued was estimated at 3,690 acres, of which 120 acres were of *Wagotar* and 3,570 acres of Wagad 8. The acreage under Wagad 8 consisted of nucleus, A and B grade areas which were rogued to cent percent, 99 and 98% purity, respectively.

CHAPTER VI.

COTTON MARKETING, LEGISLATION AND OTHER PROTECTIVE MEASURES.

(i) **Planned production of cotton.**—As a sequel to the discussions at the United Nations Conference on Food and Agriculture, at Hot Springs, Virginia, in 1943, the planning of the prodcution and distribution of agricultural products has come very much to the forefront. The Local Sub-Committee of the Indian Central Cotton Committee considered this subject at its meeting held on the 6th July, 1944, and unanimously expressed the view that the production of cotton, as of all other important agricultural commodities, should be regulated according to a definite plan on an all-India basis. In view of its importance, the Sub-Committee recommended that the matter should be discussed in all its aspects by the full Committee which should give due regard to the question of transport so as to ensure that, as far as possible, the acreage under a desirable cotton in a particular area is not unnecessarily curtailed and diverted to food grains if the requirements of food grains of that area can be met, without difficulty, by imports from a conveniently located surplus area. The subject was accordingly considered by the full Committee at its meeting held in July 1944. The Committee appointed a Cotton Planning Sub-Committee, consisting of the President, the Vice-President, Sir Purshotamdas Thakurdas, Sir Chunilal V. Mehta, Directors of Agriculture represented on the Committee, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Mr. Roger Thomas and the Secretary, to examine and report on the part which cotton should play in the planning of agricultural production and to work in close collaboration with the proposed Central Crop Planning Council.

(ii) **Deterioration in quality of Indian cotton crop.**—The Committee considered a letter from the East India Cotton Association, Ltd., Bombay, regarding the deterioration in the quality of the 1943-44 cotton crop. The Association attributed the observed deterioration to three factors (1) unseasonal weather, (2) mixing of undesirable cotton with better qualities and (3) natural crossing. They suggested that steps should be taken to improve the position by the adoption of a short term and a long term policy. The short term policy, which the Association suggested should be enforced immediately, would include (*a*) restriction of the area under short staple cotton, (*b*) issue

to agriculturists of suitable seed in the largest possible quantities and (*c*) roping off of areas producing a particular variety of cotton, thus ensuring that each strain is ginned and pressed separately and the application of stringent measures against mixing of *kapas* and of cotton, gin and pressowners being made strictly responsible for a breach of the rule. The long term policy, according to the Association, should aim at evolving, standardising and protecting a small number of suitable strains in each province with the more distant aim of further reducing the number of varieties grown until India can produce a minimum number of well-established and desirable strains. The points raised were very carefully considered by the Committee in the light of the views of the Directors of Agriculture of the major cotton growing provinces and States who were consulted in the matter. In the opinion of the Committee, the observed deterioration in the cotton crop in the season 1943-44 was due mainly to (*a*) adverse seasonal conditions during the period of crop growth and (*b*) continuance of the malpractice of mixing inferior with superior types of cotton in the districts. The Committee agreed with the view expressed by agricultural officers that natural hybridisation was a negligible factor in the deterioration brought to notice by the Association. As regards the short term policy suggested by the Association, the Committee had already made recommendations on several occasions regarding (*a*) the restriction of the area under short-stapled cottons and (*b*) the expansion of arrangements for the wide-spread multiplication of the seed of improved varieties of cotton under strict technical supervision and the issue of such pure seed to cotton growers on the widest possible scale. The Committee emphasised, however, that the fullest extension of pure seed is being seriously hampered and, in some areas, made impossible by the continuance of the malpractice of mixing. Provided that this malpractice could be eradicated, the Committee considered that the application of the Cotton Control Act to definite areas growing the same improved type of cotton immediately the seed of such types was available in sufficient quantity to meet in full the requirements of the cotton growers in such areas, was essential. In order to increase as rapidly as possible supplies of pure seed, the Committee advocated the multiplication of seed farms, the extension of co-operative ginning factories, the provision of adequate finance and the granting of premia to producers of pedigree seed.

With regard to the long term policy suggested in the Association's letter, the limitation of cotton varieties to three or four in India had already been

examined by the Committee in the past and on account of the varied conditions of soil, climate, environment, etc., in the areas in which cotton is grown, was decided to be impracticable.

(iii) **Cotton baling hoops.**—The scheme for the distribution of cotton baling hoops continued to be in operation during the year under review. Some 10,110 tons of new hoops imported under Lease/Lend and eight hundred tons of secondhand hoops were made available to cotton pressing factories through the agency of this office working in conjunction with the Iron and Steel Controller. These represented almost the entire requirements of the factories in the country for the season. The cotton baling hoops have been supplied to pressing factories subject to the condition that the factories concerned execute a bond in the prescribed form to the effect that they shall not, except with the prior permission of the Baling Hoops Advisory Committee, charge and recover in respect of any baling operation, baling charges exceeding the rates prescribed by the Government of India. On the recommendaion of the Baling Hoops Advisory Committee, the maximum pressing rate was fixed at Rs. 10 per bale. Except in the case of two factories from Bezwada, Madras Province, no application for permission to charge a higher pressing rate was entertained. Under the Cotton Baling Hoops (Control of Movement) Order, 1943, recommendations were made for the issue of permits for the acquirement of some 1,200 tons secondhand hoops.

(iv) **Fuel requirements of ginning and pressing factories.**—The arrangements for the supply of coal, under priority, to cotton ginning and pressing factories on the recommendation of this office working in conjunction with the Textile Commissioner, Bombay, were continued during the season under report. Over 1,000 applications from factories were received and disposed of during the year. Considerable difficulty was experienced by the factories in obtaining coal owing to the acute coal and wagon position and the quantity actually delivered to the factories during the season amounted to about 98,800 tons out of 126,300 tons recommended by this office.

Recommendation for supply of diesel oil to cotton ginning and pressing factories is also made by this office. In addition, assistance is given to the factories in obtaining iron and steel required for maintenance and repairs.

(v) **Dismantling of cotton ginning and pressing factories.**—Applications under the Factories (Control of Dismantling) Ordinance, 1943, for the grant of permission for the dismantling of cotton ginning and pressing factories are referred to this office for opinion by the Textile Commissioner, Bombay.

(vi) **Supply of iron for agricultural purposes.**—The attention of the Committee was drawn to the difficulties being experienced by agriculturists in securing iron, at controlled rates, for agricultural purposes. The Committee recommended that immediate steps should be taken by the Provincial and State Governments for the supply, at controlled rates, of iron required for agricultural purposes and that, in the case of scrap iron available for disposal with the Supply Department, suitable for use in the manufacture of agricultural implements and machinery, priority should be given to the manufacturers of such implements and machinery. The Government of India and the Provincial Governments were addressed accordingly. In reply, the Committee was informed by the Government of India that the question of making suitable arrangements for placing at the disposal of Provincial and State Governments necessary quantities of defective as well as good iron and steel which they might distribute to various manufacturers, etc., at reasonable rates for the manufacture of agricultural implements, was already under their active consideration.

(vii) **Provision of improved implements, machinery and fertilisers.**—The question of the improvement of the general standard of cultivation and yield of the cotton crop by the introduction of mechanical devices for cultural and harvesting operations, was considered by the Committee and the following resolution passed by it has been communicated to the Government of India :—

> "In view of the paramount importance and urgency of growing more food during the present emergency and in the interests of improvement of Indian cotton in future so as to make its production remunerative to the grower, the Committee is strongly of the opinion that concerted efforts should be made to develop the agricultural resources of the country to the fullest extent possible. The Committee is convinced that the object in view can be achieved by improved methods of farming, suitable rotation of crops, and, above all, where conditions are favourable, by the introduction of mechanical devices for cultural and harvesting operations. It accordingly requests the Government of India to give immediate facilities for manufacture in the country and import from abroad (to meet immediate requirements) of improved implements and machinery and fertilisers."

(viii) **Regulated Cotton Markets.**—Investigation into the financing and marketing of cultivators' cotton having established beyond doubt that cultivators obtain better prices for their cotton in tracts where regulated markets exist, Provincial Governments were requested by the Committee to establish such markets in all the more important cotton growing areas. Accordingly, legislation for the establishment of regulated markets has been enacted in the Provinces of Bombay, Madras, the Punjab and the Central

Provinces, and the Hyderabad, Baroda, Indore and Sangli States. In the Province of Bombay, the Agricultural Produce Markets Act has been made applicable during the year to the cotton markets at Hubli, Gadag, Bavla, Sanand and Viramgam and, including these, there are now 12 such markets in the province. It is proposed to apply the Act to Nipani, Bagalkot, Ghoti, Lasalgaon, Barsi, Pachora, Shirpur, Shahada, Kopergaon and Chalisgaon markets in the near future. In the Punjab, the Punjab Agricultural Produce Markets Act is in force in 130 localities. In Madras three regulated markets continued to function at Tirupur, Adoni and Nandyal. In Hyderabad State, the Hyderabad Agricultural Produce Markets Act has been made applicable to 23 markets.

(ix) **Agmarking.**—During the year, Agmarking of cotton bales continued at Hubli, Gadag, Bailhongal and Bijapur as a guarantee of purity of cotton by affixing Agmark labels to bales after supervision of ginning and pressing by the special staff. Agmarking has been made applicable to V. 434 on an experimental basis. It is also proposed to apply the Agmark to Perso-American cotton.

(x) **Universal Standards.**—As mentioned in previous reports, since 1934, with the co-operation of the East India Cotton Association and the Karachi Cotton Asscciation, Universal Standards common to both the markets have been prepared by a Special Sub-Committee of the Indian Central Cotton Committee. At the instance of the Associations, however, it was decided, as mentioned in last year's report, to drop the preparation of Universal Standards for the period of the war.

In order to check the spread of undesirable or inferior types of cotton and insect pests and diseases and other malpractices, several legislative measures have been passed by the Central and Provincial Governments on the recommendation of the Indian Central Cotton Committee. These are dealt with below.

(xi) (a) **Cotton Transport Act.**—A brief account of the working of this Act is contained in previous reports. During the year, notification was issued by the Government of India under the Cotton Transport Act prohibiting the import by rail of all cotton into the protected areas of the Gwalior State except under licences issued by the State authorities.

(b) **Cotton Ginning and Pressing Factories Act.**—It will be recalled that, in view of certain complaints received regarding the presence of foreign matter

in Indian cotton bales, the Committee had recommended that the Cotton Ginning and Pressing Factories Act, 1925, in other Provinces and major Indian States should be amended on the lines of the Bombay or Central Provinces (Amendment) Act in order to provide for the licensing of ginning and pressing factories and for penalising the presence in cotton bales of cotton seed (in excess of a prescribed percentage), cotton waste and foreign matter. The Mysore Durbar passed the necessary legislation (The Mysore Amendment Act, 1943) which also provided penalties for watering of cotton. The Amendment Act, however, contained no provision similar to that in the Bombay Amendment Act, 1938, making the deliberate watering of cotton a penal offence, and the attention of the Durbar has been drawn to this omission.

The Committee noted with satisfaction the action of the Kolhapur Durbar in passing the Kolhapur Cotton Ginning and Pressing Factories (Amendment) Act, 1941, which, *inter alia*, includes provisions relating to the licensing of gins and presses, foreign matter and watering of cotton. The Committee agreed to the Durbar's request that the services of the Technological Laboratory may be made available to it for carrying out moisture tests on cotton samples on payment of fees and for issue of certificates.

The Dhar State Cotton Ginning and Pressing Factories (Amendment) Act, 1942-43, passed by the Dhar Durbar gives effect to the amendment dealing with the structural requirements of factories and the rejection of unmarked bales in fulfilment of contracts introduced by the Cotton Ginning and Pressing Factories (Amendment) Act, 1939, and also provides for the submission of monthly returns of cotton ginned by ginning factories in the State.

The Government of the Punjab intimated that consideration of the Punjab Cotton Ginning and Pressing Factories Bill, dealing with the control of (1) the mixing of different varieties of cotton, (2) the watering of cotton and (3) the adulteration of cotton with cotton seed, had been postponed for the period of the war. It was emphasised to the Punjab Government that, in the opinion of the Committee, the legislation suggesed was a beneficial measure in the interests of the cotton growers of the Province and that the Provincial Government should reconsider their decision and give effect to the recommendation of the Committee as early as possible.

Arising out of a reference received in 1940, from the Director of Industries, Central Provinces and Berar, suggesting the amendment of the Cotton Ginning

and Pressing Factories Act to provide for penalties against watering of cotton by ginning factories, in certain cases not covered by the existing legislation in the Province, the Committee at its meeting in January 1943, after consulting the East India Cotton Association, Bombay, decided that Section 3A of the Cotton Ginning and Pressing Factories Act, 1925, in its application to the Central Provinces and Berar, should be amended to read as follows :—

" 3A. Prohibition against watering etc., of cotton.

(1) The Provincial Government may, by notification, declare that in any area specified in such notification, no cotton which is ginned or pressed in a cotton ginning or cotton pressing factory shall contain any admixture of cotton.

(2) Any owner of a cotton ginning or cotton pressing factory or any person in charge of such factory—

(*a*) who knowing or having reason to believe that any cotton is watered or contains any foreign substance, or cotton waste, gins or presses or allows such cotton to be ginned or pressed in such factory, or

(*b*) who in any area specified in the notification under sub-section (1) gins or presses or allows to be ginned or pressed any cotton which he knows or has reason to believe to contain an admixture of cotton,

shall, on conviction, be punishable with fine which may extend to fifteen hundred rupees.

(3) Any owner of a cotton pressing factory who knowing or having reason to believe that any cotton contains seed in excess of the prescribed proportion, presses or allows such cotton to be pressed in such factory, shall, on conviction, be punishable with fine which may extend to fifteen hundred rupees.

Explanation.—For the purposes of this section, cotton shall not be deemed to be watered, unless such cotton contains moisture in excess of the normal quantity. The normal quantity of moisture in any given quantity of cotton is the amount of moisture that such cotton is reasonably expected to have, regard being had to the place or places at or to which, and the time or times of the year in which, such cotton has been picked, collected, stored, conveyed, left, ginned or pressed. A certificate

given by the prescribed authority as to the normal quantity of moisture that a given quantity of such cotton should have and the quantity of moisture that it possesses shall be evidence of such matters, until the contrary is proved ; and if the latter quantity exceeds the former it shall be evidence, until the contrary is proved, that the cotton is watered.

3AA. Any owner of cotton who knowingly makes or causes to be made any cotton which is ginned and which is being or is intended to be pressed in a cotton pressing factory, wet, or mixes or causes to be mixed seed, foreign substance or cotton waste with such cotton, or in any area specified in sub-section (1) of section 3A makes any admixture of cotton, or abets or knowingly allows or connives at any such act shall, on conviction, be punishable with fine which may extend to fifteen hundred rupees."

The Central Provinces Government who were accordingly addressed replied to say that they did not consider it necessary to undertake legislation of this kind in the present circumstances caused by the war situation. The need for undertaking the amending legislation even during the period of war has been stressed to the Provincial Government.

Out of 67 Indian States which have enforced in their territories the main provisions of the Cotton Ginning and Pressing Factories Act as applied to British India, by legislation or executive orders, weekly returns of cotton pressed were received from 62 ; in the remaining States, pressing factories did not work during the year.

(c) **Prohibition of mixing of different varieties of cotton**—In connection with the question of expansion of seed distribution schemes, the Provinces and States were addressed for information regarding the localities for which improved cottons have been produced, the extent to which it is not possible to provide adequate seed supplies for each such area, the reasons concerned and the steps necessary to make adequate supplies available. The Committee considered the replies received from the Provinces and States. It had also before it the view expressed by its Agricultural Research Sub-Committee, after examining the replies, that the real obstacle in the way of extension of pure seed supply was mixing and that, until such time as this malpractice could be effectively stopped, the establishment of pure seed blocks would remain impossible of achievement. Further, in connection with the observed deterioration in the cotton crop of the 1943-44 season, the East India Cotton Association had recommended the application of stringent measures against

mixing of *kapas* and cotton, gin and pressowners being made strictly responsible for a breach of the rule.

The problem of mixing had been under consideration, in some way or other, for many years and no effective solution on an all-India basis had so far been found, but the point was that the matter had assumed serious aspect only in the last two or three years during which the character of the crop had undergone a remarkable change. The stage had now been reahced when in the interests of Indian cotton as a whole, the question could no longer be shelved. Even from the point of view of ensuring export outlets for Indian cotton after the war, it was imperative that early action in the matter should be taken. There were four kinds of mixtures to be dealt with ; (1) field mixtures arising from mixed seed sown by the farmer, (2) deliberate mixing by the middleman or the merchant before cotton is brought to the market, (3) mixing in the ginneries and (4) mixing after ginning before cotton is pressed. It was suggested that the Central Government should be requested to amend the Cotton Ginning and Pressing Factories Act on the lines of the Bombay Amendment Acts, 1936 and 1988 so as to provide for the licensing of ginning and pressing factories and prohibition of mixing of different varieties of cotton. The Government of India should thereafter suggest to the Provincial Governments to give effect to the provisions of the Amended Act and commend its application also to Indian States. As regards the cotton grown mixed and cotton which is mixed by the middleman or the merchant before being brought to the market, it was suggested that a certain percentage of tolerance, say, 5%, might be allowed and anything above that should be marked as mixed cotton. After a lengthy debate, the Committee passed the following resolution which has been forwarded to the Government of India for necessary action :—

" The Indian Central Cotton Committee is convinced that the malpractice of mixing of different varieties of cotton is seriously hampering the work of cotton improvement in the country. It is the considered view of the Committee that until this malpractice is made a penal offence, it will be impossible to provide seed of improved varieties of cotton in quantities adequate to meet requirements. In the interests of Indian cotton as a whole, therefore, the Committee is unanimously of the opinion that, as a first step, the mixing of short staple with medium and long staple cotton and of medium with long staple cotton at the factories should be forthwith prohibited by the Government of India, by legislation. The Committee further recommends that steps be taken by the Government of India to ensure that the legislation is put into effect by the Provincial and State Governments as soon as possible and, in any case, well in advance of the cotton season commencing 1st September, 1945. The Committee has no doubt that the adoption of the measures

suggested by it will have a beneficial effect on the food position of the country for, if the utilisation of short staple cotton for mixing purposes is stopped, the production of such cotton would be automatically reduced to the minimum commensurate with requirements."

(d) **Prevention of Introduction of Foreign Cotton Pests.**—In order to prevent the introduction into India of the Mexican Boll-weevil (*Anothonomus grandis*) with imported American cotton, at the instance of the Committee, regulations have been imposed by the Government of India under which the import of American cotton into India is prohibited except through the port of Bombay where it must be fumigated with hydrocyanic acid gas before entry into the country. The work of fumigation is carried out under the technical supervision of the Secretary, and the cost involved is met by the levy of a small fee from importers on each bale of American cotton fumigated. Owing to the restrictions necessitated by the war, there were no imports of American cotton during the year under review.

(e) **The Red (Sudan) Bollworm (Diperopsis castanea) and other pests.**—The restriction on the import of foreign *kapaṣ* (unginned cotton) and of foreign cotton seed remained in force throughout the year.

(f) **Cotton Control Acts.**—Cotton Control Acts are in operation in the Provinces of Madras, Bombay and the Central Provinces and in the Baroda and Bhopal States. The aims and objects of these Acts in the areas where they are in force are stated in previous years' reports.

In Bombay, the spread of Selection 1A in preference to 1027 A.L.F., in parts of Surat district where *Goghari* was formerly grown, is still going on. The new improved variety "Suyog" which is nearly as good as 1027 A.L.F. in staple and as Selection 1A in ginning, is being extended by the Agricultural Department. This is expected to solve the problem of the tract.

On account of the mixing of inferior cotton with superior types in the Southern Mahratta Country, a notification has been submitted to Government with a view to applying the Act to the tract in question. Government have notified the application of the Act to the whole of Khandesh.

In Baroda State, the Act worked very well during the year.

D. N. MAHTA

Secretary.

APPENDIX I.

BALANCE SHEET AS ON 31st MARCH, 1944.

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Cotton Cess Receipts	1,54,96,436	11	4				I. A. Administration				24,62,481	2	6
Less.—Refunds of cess to Burma	42,369	10	9	1,54,54,067	0	7	B. *Improvement of Cotton Marketing*—						
Interest account.—							1. Cost of exhibits, travelling allowance of representatives on the Board of East India Cotton Association and members of Standards Sub-Committee and cost of Standards ..	1,94,233	9	9			
Amount received on investments	22,76,730	3	7				2. Enquiry into cost of cotton production in India	2,71,963	8	9			
Add.—Refund of incometax from interest ..	26,949	15	0								4,66,197	2	6
	23,03,680	2	7				C. Travelling allowance of Non-official members				2,81,772	8	9
Less.—							D. *Printing & Propaganda.*—						
1. Interest paid in advance at the time of purchasing Government papers (since recovered) interest on temporary overdraft and Bank's commission for collection of interest	64,268	10	4				1. Publicity & Propaganda ..	1,56,555	15	0			
2. Interest credited to Provident Fund ..	4,886	6	2				2. Printing & Distribution ..	1,30,697	14	9	2,87,253	13	9
3. Bank's withdrawal charges	5,705	2	0				E. *Statistical Research.*—						
4. Incometax on interest on Government papers	30,877	9	1				1. Studies of village consumption of Indian cotton	23,913	5	8			
							2. Improvement of Cotton Forecast.	30,772	9	0			
5. Brokerage for securities sold	828	10	0				3. Crop estimating survey on cotton in Central Provinces	13,682	9	0			
6. Provision for Sinking Fund	19,132	9	0								68,368	7	8
	1,25,698	14	7	21,77,981	4	0	II. *Agricultural Research grants.*—						
Profit on conversion and sale of securities ..				3,47,382	12	2	(1) RESEARCH SCHEMES.						
Sinking Fund account				19,132	9	0	(*i*) *Bombay.*—						
Miscellaneous Receipts				1,45,488	11	11	(1) A. Surat Physiological	2,45,139	11	3			
Refund from Provident Fund for contributions disallowed				3,391	1	11	B. Surat Physiological Writing-up	5,814	7	8			
General Suspense account				539	6	3	(2) A. Surat Bollworm	1,14,509	9	7			
							B. Surat Bollworm Propaganda;	91,468	9	2			
							C. Surat Bollworm Writing-up.	2,315	3	0			
							(3) A. Dharwar Wilt	1,82,836	4	11			
							B. Dharwar Wilt Writing-up ..	10,902	10	3			
Carried over ..				1,81,47,982	13	10	Carried over ..	6,25,986	7	10	35,66,073	3	2

BALANCE SHEET AS ON 31ST MARCH, 1944.—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,81,47,982	13	10	Brought forward ..	6,52,986	7	10	35,66,073	3	2
Receipts from the Cotton Fund				97,245	0	0							
Amount received from the Iron and Steel Controller, Calcutta on account of the fee for distribution of baling hoops	3,925	2	0				*Bombay*—contd.						
Less.—Expenditure incurred in 1942-43 ..	3,719	6	0	205	12	0	(4) Khandesh	26,573	5	0			
							(5) Co-ordination of Cotton Research	1,749	7	6			
							(6) Jalgaon Cotton Breeding ..	74,988	3	6			
							(7) Broach Cotton Breeding ..	1,05,044	10	2			
							(8) Small Leaf Disease Survey ..	3,938	9	6			
							(9) Survey of Goghari Cotton ..	4,199	5	0			
							(10) Defibration of Cotton Seeds ..	4,878	5	9			
							(11) Plant Pullar Propaganda ..	21,940	1	3			
							(12) Breeding of Wilt Resistant Cotton for Surat Area	19,008	4	0			
							(13) Model Projects for improvement of cotton cultivation of crops..	1,328	15	0			
							(14) Inclusion of Northerns & Westerns in Dry Farming Research at Bijapur	6,953	12	7			
							(15) Poona Wilt Breeding	57,759	2	6			
							(16) Improvement of Cotton Crop in Kaira District	5,629	14	6			
							(17) Interspecific Hybridisation at Surat	42,866	7	3			
							(18) Dholleras Wagad Cotton at Viramgam	38,163	14	2			
							(19) Improvement of Dharwar-American cotton	5,671	1	6			
							Total ..	10,73,679	15	0			
							(*ii*) *Madras.*—						
							(1) Herbaceum	1,42,466	13	1			
							(2) Pempheres and Physiological ..	2,01,057	10	3			
							(3) Fodder Cholam	19,517	9	4			
							(4) Breeding of Nadam cotton ..	17,727	2	6			
							(5) Improvement of Mungari cotton.	36,909	4	6			
							(6) Investigation of the possibilities for control of cotton stem weevil	6,165	7	6			
							(7) Improvement of Cocanadas cotton	32,354	11	3			
							Total ..	4,56,198	10	5			
Carried over ..				1,82,45,433	9	10	Brought forward ..	15,29,878	9	5	35,66,073	3	2

BALANCE SHEET AS ON 31ST MARCH, 1944.—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward ..				1,82,45,433	9	10	Brought forward ..	15,29,878	9	5	35,66,073	3	2
							(*iii*) *Punjab.*—						
							(1) Botanical	6,55,090	15	9			
							(2) Entomological	2,25,908	7	11			
							(3) White Fly	48,721	4	1			
							(4) Root Rot	71,048	10	10			
							(5) Spraying Trials	9,977	0	6			
							(6) Defibrating and Delinting ..	6,112	8	9			
							(7) Survey of Disease of Malformation	1,730	10	6			
							(8) Physiological	4,09,580	0	7			
							(9) Clean-up Campaigh of Spotted Bollworm	60,025	9	3			
							(10) Jassid Investigation	19,053	0	6			
							(11) Improvement of Punjab-American 289F	16,216	5	3			
							Total ..	15,23,464	9	11			
							(*iv*) *Central Provinces.*—						
							(1) Botanical	4,93,449	9	4			
							(2) Entomological	12,344	13	6			
							(3) Investigation of Heliothis Obsoleta	1,672	9	9			
							(4) Central Provinces & Berar Cotton Breeding Scheme ..	48,005	4	3			
							(5) Model Projects for extension of improvement in cultivation of crops	1,127	1	0			
							Total ..	5,56,599	5	10			
							(*v*) *United Provinces.*—						
							(1) Pink Bollworm	1,46,616	2	10			
							(2) Rohilkhand and Bundelkhand Survey	18,061	14	4			
							(3) Botanical	93,053	13	0			
							(4) Model Project for extension of improvement in cultivation of crops	1,231	9	0			
							Total ..	2,59,863	7	2			
Carried over ..				1,82,45,433	9	10	Carried over ..	38,69,806	0	4	35,66,073	3	2

BALANCE SHEET AS ON 31ST MARCH, 1944.—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,82,45,433 9 10	Brought forward ..	38,69,806 0 4	35,66,073 3 2
			(*vi*) *Indore.*—		
			(1) Institute of Plant Industry ..	19,86,943 12 0	
			(2) Cotton Genetics Research Scheme	1,45,739 9 9	
			Total ..	21,32,683 5 9	
			(*vii*) *Sind.*—		
			(1) Physiological	2,63,945 12 10	
			(2) Jassid Investigation	15,471 15 1	
			(3) Black-headed Cricket	9,245 1 3	
			(4) Scheme for investigation for production of long staple cotton..	1,02,147 14 5	
			(5) Bollworm Investigation and Clean-up Scheme	74,434 4 6	
			Total ..	4,65,245 0 1	
			(*viii*) *Burma.*—		
			(1) Capital Expenditure	2,906 15 5	
			(2) Cotton Improvement	47,790 3 9	
			Total ..	50,697 3 2	
			(*ix*) *Hyderabad.*—		
			(1) Botanical	4,21,773 13 5	
			(2) Cotton Survey	36,578 3 0	
			(3) Pink and Stpotted Bollworm ..	83,976 10 4	
			(4) Improvement of Kumpta cotton.	41,142 3 10	
			(5) Inclusion of Northern and Westerns in Dry Farming Scheme at Raichur	2,000 4 0	
			(6) Pink and Spotted Bollworm Clean-up Campaign	53,929 2 0	
			(7) Improvement of cottons of the Oomras tract	28,627 7 7	
			Total ..	6,68,027 12 2	
Carried over ..		1,82,45,433 9 10	Carried over ..	71,86,459 5 6	35,66,073 3 2

BALANCE SHEET AS ON 31ST MARCH, 1944.—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,82,45,433 9 10	Brought forward ..	71,82,459 5 6	35,66,073 3 2
			(*x*) *Bikaner.*—		
			Bengals Cotton Improvement ..	70,377 10 11	
			(*xi*) *Baroda.*—		
			(1) Root Rot	92,888 3 2	
			(2) Comparative Tests	4,251 5 3	
			(3) Survey of Goghari cotton ..	3,891 14 7	
			(4) Plant Puller Propaganda ..	32,533 15 10	
			(5) Mathio cotton at Amreli and Jagudan	29,378 14 9	
			Total ..	1,62,944 5 7	
			(*xii*) *Bengal.*—		
			(1) Comilla Scheme	43,919 14 9	
			(2) Cultivation of Long Staple cotton	9,536 11 3	
			Total ..	53,456 10 0	
			(*xiii*) *Mysore.*—		
			Doddahathi	24,801 3 9	
			(*xiv*) Collection of Iran cottons	3,121 12 0	
			(*xv*) *Baluchistan.*—		
			Co-ordination of research on Black-headed Cricket in Sind and Baluchistan	33,371 8 5	
			(*xvi*) Preliminary Scheme at Nawanagar .	323 12 4	
			(*xvii*) Estimation of effects on cotton crop of the use of Plant Puller ..	4,143 12 5	
					75,39,000 0 11
Carried over ..		1,82,45,433 9 10	Carried over ..		1,11,05,073 4 1

BALANCE SHEET AS ON 31ST MARCH, 1944.—(*contd.*)

RECEIPTS.	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
Brought forward				1,82,45,433	9	10	Brought forward ..				1,11,05,073	4	1
							(2) SEED DISTRIBUTION & EXTENSION SCHEMES.						
							(*i*) *Bombay.*—						
							(1) Hubli	44,048	8	3			
							(2) Gadag	41,700	15	1			
							(3) Gadag (Supplementary) ..	20,167	11	4			
							(4) Surat	92,095	2	4			
							(5) Athani	18,086	1	7			
							(6) Khandesh (Banilla)	1,65,580	4	0			
							(7) Khandesh (Jarila)	1,39,786	5	9			
							(8) Deccan Canals (Banilla) ..	3,333	3	4			
							(9) B. D. 8	40,729	1	9			
							(10) Revised Jayawant and Gadag No. 1	2,08,694	6	7			
							(11) Maintenance of nucleus of pure seed of improved varieties of cotton	9,664	6	3			
							(12) Scheme for control of Selection 1A	4,584	6	0			
							(13) Collection of 1027 A. L. F. cotton in Navapur Taluka ..	2,940	1	0			
							(14) Scheme for Multiplication of Vijaya cotton	81	1	0			
							Total ..	7,91,491	10	3			
							(*ii*) *Madras.*—						
							(1) Pay and allowance of Business Manager Tirpur	24,079	13	0			
							(2) Co. 2	41,286	2	9			
							(3) H. 1	12,550	1	9			
							(4) Maintenance of nucleus of pure seed of improved varieties of cotton	2,709	1	11			
							(5) Co. 3 in Salem District	7,234	15	0			
							Total ..	87,860	2	5			
Carried over ..				1,82,45,433	9	10	Carried over ..	8,79,351	12	8	1,11,05,073	4	1

BALANCE SHEET AS ON 31ST MARCH, 1944.—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,82,45,433 9 10	Brought forward ..	8,79,351 12 8	1,11,05,073 4 1
			(*iii*) *Sind.*—		
			(1) Seed Distribution	4,16,455 9 10	
			(2) Maintenance of nucleus of pure seed of improved varieties of cotton	9,862 13 5	
			(3) Financing of seed distribution ..	82,556 12 0	
			Total ..	5,08,875 3 3	
			(*iv*) *Hyderabad*:—	51,307 13 3	
			(*v*) *Central Provinces.*—		
			(1) Maintenance of nucleus of pure seed of improved varieties of cotton	3,260 7 6	
			(2) Jarila Seed Distribution Scheme.	6,229 15 0	
			Total ..	9,490 6 6	
			(*vi*) *Baroda.*—		
			(1) Navsari seed Storage	35,304 4 4	
			(2) B. D. 8	17,330 11 9	
			(3) B. 9	4,952 4 7	
			(4) Scheme for creation of pure Wagad Cotton Zone in Mehsana District	2,580 0 0	
			Total ..	60,167 4 8	
			(*vii*) Lyallpur ginnery	16,038 3 3	
			(*viii*) *United Provinces.*—		
			(1) Co. 4	18,616 11 6	
			(2) Perso-American Cotton in Western Districts	24,303 15 0	
			Total ..	42,920 10 6	
					15,68,151 6 1
Carried over ..		1,82,45,433 9 10	Carried over ..		1,26,73,224 10 2

BALANCE SHEET AS ON 31ST MARCH, 1944—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
		1,82,45,433 9 10	Brought forward ..		1,26,73,224 10 2
			(3) MARKETING SCHEMES.—		
			(1) Grading and Marking of 1027 A. L. F. in Surat area.. ..	5,300 10 9	
			(2) Punjab Cotton Marketing Survey	7,214 1 6	
			(3) Baroda Better Marketing of 1027 A. L. F.	13,693 6 3	
			(4) Extension and Marketing of V. 434 C. P.	3,63,821 5 4	
			(5) Distribution and Marketing of Buri 107 cotton in Burhanpur Tahsil	24,492 0 0	
					4,14,521 7 10
			Total ..		
			(4) MISCELLANEOUS SCHEMES.—		
			(1) Compilation of Manurial Trials..	719 15 0	
			(2) Compilation of Hand-book dealing with pests and diseases of cotton in the Empire	2,975 5 0	
			(3) Survey of nutritional values in relation to milch buffaloes of fuzzy cotton seed and cotton seed cakes manufactured from such seeds	20,554 14 0	
			(4) Scheme for Research on Chemical finishes	1,600 0 0	
					25,850 2 0
			Total ..		
Carried over ..		1,82,45,433 9 10	Carried over ..		1,31,13,596 4 0

BALANCE SHEET AS ON 31ST MARCH, 1944.(*concld.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		1,82,45,433 9 10	Brought forward		1,31,13,596 4 0
			III. *Technological Research.*—		
			1. *Technological Laboratory.*—		
			A. Capital Expenditure—		
			(1) Land & Buildings	4,07,988 14 6	
			(2) Machinery	1,23,212 1 2	
			(3) Freight	7,502 2 8	
			(4) Apparatus & Equipment ..	41,668 5 7	
			(5) Machinery & Workshop	5,789 8 3	
			B. *Working Expenses.*—	30,30,074 5 4	
			2. Provincial	2,37,799 12 8	
			3. Development of alternative uses of Indian cotton.—		
			(*a*) Capital Expenditure ..	29,006 7 9	
			(*b*) Working Expenditure ..	49,699 3 5	
			4. Investigation for Improvement in the ginning of Indian cotton.—		
			(*i*) Capital Expenditure	34,072 13 9	
			(*ii*) Working Expenditure ..	15,806 10 0	39,82,620 5 1
			IV. Research Studentships	2,82,566 1 4	
			Less.—Refund from Dr. Taskhir Ahmad.	3,086 12 0	2,79,479 5 4
			By Suspense account		4,540 6 8
			BY BALANCE		8,65,197 4 9
GRAND TOTAL ..		1,82,45,433 9 10	GRAND TOTAL ..		1,82,45,433 9 10

INDIAN CENTRAL COTTON COMMITTEE.

PROVIDENT FUND ACCOUNT.

Balance Sheet as on 31st March, 1944.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Subscribers' contribution account	4,90,333 2 10		Advance to Subscribers	1,13,279 6 0	
Less.—Payment made to subscribers resigned..	1,64,263 6 7	3,26,069 12 3	*Less.*—Recoveries made up to 31-3-1944 ..	92,584 14 0	20,694 8 0
Committee's contribution account	4,80,078 4 0		Accrued interest on Government paper credited to subscribers for distribution up to 31-3-44.		5,961 3 4
Less.—Payment made to subscribers resigned and forfeitures for Committee's contributions disallowed	1,58,973 8 6	3,21,104 11 6	By Balance as per details attached		6,73,240 0 4
Lapse and Forfeiture account		15,262 5 11			
Net interest received on investments		17,406 14 6			
Investment and fluctuation account		18,209 5 5			
Suspense receipts.—					
Amount due to subscriber deceased—Mr. N. Srecnivas	500 0 0				
Suspense deposit of Mr. Dutt's own contribution	1,342 10 1	1,842 10 1			
Total ..		6,99,895 11 8	Total ..		6,99,895 11 8

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1944.

RECEIPTS.	Rs. a. p.	Rs. a. p.	PAYMENTS.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April 1943	11,46,344 5 6		*Administration of the Committee.*—		
Sinking Fund	17,517 8 0		(Including Improvement of Cotton Marketing, Printing, Publicity and Distribution and Travelling Allowance of Non-Official Members)		1,72,494 3 3
		11,63,861 13 6	*Agricultural Research Grants-in-Aid.*		
Less.—Adjustments of Suspense Receipts received during 1942-43.		212 14 3	(Including Research, Seed Marketing and Miscellaneous Schemes)		5,62,017 0 9
		11,63,648 15 3	*Technological Research*		2,03,215 11 4
Receipts under Section 12 of the Indian Cotton Cess Act, 1923.		4,84,128 11 0			9,37,726 15 4
Other Receipts.—			*Closing Balance.*—		
Sale of Publications, sale of cotton, Miscellaneous Receipts, Test Fees, etc.	15,659 3 7		(Government Paper at cost).		
Suspense Receipts ..	539 6 3		3% Government of India Defence Bonds, 1946, of the face value of Rs. 97,500	86,287 13 0	
Sinking Fund provision for 1943-44	1,615 1 0	17,813 10 10	3½% Government of India Loan, 1947-50, of the face value of Rs. 4,50,000	3,93,314 1 0	
Interest on Investments ..		44,422 9 8	4½% Government of India Loan, 1955-60, of the face value of Rs. 26,600	25,004 0 0	
		62,236 4 6	6% Bombay Municipal Debentures, 1954, of the face value of Rs. 10,000	3,950 0 0	
Amount received from the Cotton Fund at the disposal of the Government of India		97,245 0 0	6% Rangoon Municipal Debentures, 1955, of the face value of Rs. 3,83,500	4,15,328 2 0	
				9,23,884 0 0	
Fees at 1 anna per cwt. received from the Iron and Steel Controller, Calcutta, for distribution of Baling Hoops		3,925 2 0	(Market Value on 31st March 1944, Rs. 10,21,456-11-0, inclusive of Rangoon Municipal Debentures taken at cost) ..		
Less.—Expenditure incurred under Suspense in 1942-43.		3,719 6 0	* An Overdraft of Rs. 63,261-11-3 with the Imperial Bank of India, Bombay, has been secured against the Hypothecation of 3½% Government of India Loan, 1947-50 of the face value of Rs. 1,50,000.		
		205 12 0			
Carried over ..		18,07,464 10 9	Carried over ..		9,37,726 15 4

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1944.—(*concld*).

RECEIPTS.	Rs. a. p.	Rs. a. p.	PAYMENTS	Rs. a. p.	Rs. a. p.
Brought forward ..		18,07,464 10 9	Brought forward ..		9,37,726 15 4
			Imprests.— Rs.		
			(1) Secretary's Office 1,500		
			(2) Director, Technological Laboratory, Matunga 500		
			(3) Director of Agriculture, Bombay. 1,270		
			(4) Director of Agriculture, Sind .. 725		
			(5) Cotton Research Botanist, Lyallpur 150		
			(6) Plant Physiologist, Punjab .. 100		
			(7) Geneticist and Botanist, Indore .. 300		
			(8) Agricultural Chemist, Lyallpur .. 30	4,575 0 0	
			Suspense (Recoverable)	4,540 6 8	
				9,32,999 6 8	
			Less.—Overdraft Account with the Imperial Bank of India, Bombay, (against hypothecation of 3½% Government of India Loan, 1947-50, of the face value of Rs. 1,50,000) ..	63,261 11 3	
			@ Total Closing Balance		8,69,737 11 5
			Total ..		18,07,464 10 9
Total ..		18,07,464 10 9	@ Includes Rs. 19,132-9-0 on account of Sinking Fund.		

We have examined the above Statement of Receipts and Payments of Indian Central Cotton Committee with the Books, Vouchers and Certified Returns of the Committee, have obtained all the information and explanations we have required, and certify that to the best of our information and explanations received, the above Statement is a correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the Indian Cotton Cess Act, 1923.

BOMBAY, *26th June*, 1944.

(Sd.) S. B. BILLIMORIA & CO.,
Registered Accountants, Auditors.

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH, 1944.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April, 1943	6,07,094 13 10			*Balance.*—		
				(Government Securities at Market Value).		
Less.—Adjustment of Suspense Receipts	87 8 0			3½% Government Promissory Notes of the face value of Rs. 3,68,500	3,61,590 10 0	
		6,07,007 5 10				
Subscribers' Contributions ..	29,440 6 0			3% Government of India Loan, 1951-54, of the face value of Rs. 32,000	31,980 0 0	
Add.—Recoveries against Advances	13,865 11 0	43,306 1 0		3½% Government of India Loan, 1947-50, of the face value of Rs. 1,20,000	1,23,450 0 0	
		6,50,313 6 10		4% Government of India Loan, 1960-70, of Rs. 12,600	14,167 2 0	
Less.—Refunds to Subscribers who have resigned ..	9,958 11 5			2½% Government of India Loan, 1948-52, of the face value of Rs. 70,000	69,737 8 0	
Advances to Subscribers ..	11,228 5 0	21,187 0 5		3% Government of India Loan, 1949-52, of the face value of Rs. 35,000	35,196 14 0	
		6,29,126 6 5			6,36,122 2 0	
Committee's Contribution received from Indian Central Cotton Committee.. ..		29,440 6 0		*Savings Bank Account* with the Imperial Bank of India, Bombay	491 14 0	
		6,58,566 12 5		*Current Account* with the Imperial Bank of India, Bombay	36,626 0 4	
Less.—Payments made to Subscribers who have resigned, including transfers to "Lapse and Forfeiture Account" for contributions disallowed		9,697 12 6				6,73,240 0 4
			6,48,868 15 11			
Interest received on Investments	20,807 4 0					
Interest received on Advances to Subscribers	481 13 8					
		21,289 1 8				
Carried over ..		21,289 1 8	6,48,868 15 11	Carried over ..		6,73,240 0 4

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH, 1944.—(*concld*).

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ..		21,289 1 8	6,48,868 15 11	Brought forward ..		6,73,240 0 4
Less.—Interest paid during the year to subscribers who have resigned :—						
On their own Contributions.	83 4 9					
On Committee's Contributions	75 7 8					
Interest paid in advance at the time of purchase of (since received) Govt. Securites	3,357 4 7					
Income-tax deducted from interest on Government Securities	2,309 6 10					
Withdrawal charges	188 15 0					
Bank's commission for collection of interest and stamp charges	19 11 0	6,034 1 10	15,254 15 10			
Investments Fluctuation Account.—Net appreciation in market value of securities.		9,208 13 4				
Less.—Net Profit realised on sale of 3% Defence Bonds, 1946, transferred to "Lapses and Forfeiture Account" as per Provident Fund Rule No. 13 ..		8,237 14 0	970 15 4			
Lapses and Forfeitures Account			8,145 1 3			
Total ..			6,73,240 0 4	Total ..		6,73,240 0 4

BOMBAY, 26*th June*, 1944.

Examined and found correct.
(Sd.) S. B. BILLIMORIA & Co.
Registered Accountants, Auditors,

APPENDIX II.

MEMBERS OE THE INDIAN CENTRAL COTTON COMMITTEE.

1) PRESIDENT—

Mr. H. R. Stewart, C.I.E., I.A.S., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*.

(*a*) The Agricultural Commissioner with the Government of India, *ex-officio*.

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS—

Madras	Rao Bahadur Dr. B. Viswanath, C.I.E., F.I.C., Director of Agriculture.
Bombay	Mr. W. J. Jenkins, C.I.E., I.A.S., Director of Agriculture.
United Provinces	Mr. C. Maya Das, I.A.S., Director of Agriculture.
Punjab	Malik Sultan Ali Noon I.A.S., Director of Agriculture.
Central Provinces and Berar ..	Mr. R. H. Hill, I.A.S., Director of Agriculture.
Sind	Mr. V. Isvaran I.C.S., Director of Agriculture.

(3) THE DIRECTOR OF COMMERCIAL INTELLIGENCE, *ex-officio*.

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS—

The East India Cotton Association ..	Sir Purshotamdas Thakurdas, K.B.E., C.I.E.,
The Bombay Millowners' Association ..	Sir Sorab Saklatvala, M.L.A.
The Bombay Chamber of Commerce ..	Mr. C. P. Bramble, M.L.A.
The Indian Merchants' Chamber ..	Sir Chunilal B. Mehta. (*Vice-President.*)
The Karachi Chamber of Commerce ..	Mr. A. P. Darlow.
The Ahmedabad Millowners' Association	Mr. Ramanlal Lallubhai.
The Tuticorin Chamber of Commerce ..	Mr. J. L. Hurschler.
The Upper India Chamber of Commerce	Major S. R. Pocock, M.C., M.L.A.
The Empire Cotton Growing Corporation	Sir William Roberts, C.I.E.

(5) COMMERCIAL REPRESENTATIVES NOMINATED BY CENTRAL GOVERNMENT—

Central Provinces and Berar	Rao Saheb P.V. Deshmukh. Mr. Y. G. Deshpande.
Madras	Mr. J. R. Marshall.
Punjab	Sardar Bahadur Sardar Ujjal Singh, M.L.A.

(6) BENGAL REPRESENTATIVE .. .. Mr. Suryya Kumar Basu.

(7) CO-OPERATIVE BANKING REPRESENTATIVE—Sir Chunilal V. Mehta, K.C.S.I.

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

Madras	Mr. K. V. Odhumalai Gounder. Mr. L. Madhava Reddi.

Bombay	Mr. S. T. More, Mr. B. K. Patel.
United Provinces	Major Nawab Mohd. Jamshed Ali Khan, M.B.E., M.L.A. Rai Bahadur Kunwar Laxmi Raj Singh, M.L.C.
Punjab	Chaudhri Ram Sarup, M.L.A. Major T. G. M. Harris, O.B.E.
Central Provinces and Berar	Rao Bahadur Sir Madhaorao G. Deshpande, K.B.E., Rao Bahadur Uttamrao Patil.
Sind	Mr. Roger Thomas, C.I.E.

(9) AND (10) REPRESENTATIVES OF INDIAN STATES.—

Hyderabad State	Rai Saheb Kalidas Sawhney, Director of Agriculture (Research.)
Baroda State	Mr. R. G. Allan, C.I.E., Commissioner of Agriculture.
Gwalior State	Mr. N. M. Deshmukh, Director of Agriculture.
Rajputana and Central India States ..	Rao Bahadur V. A. Tamhane.

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN COUNCIL :—

1. Rao Bahadur S. S. Salimath, Headquarters Deputy Director of Agriculture, Poona.
2. Mr. M. J. Narasimhan, Director of Agriculture in Mysore, Bangalore.
3. Rao Bahadur V. Ramanatha Ayyar Avl., Headquarters Deputy Director of Agriculture, Madras.
4. Musahib-i-khas Bahadur Capt. H. C. Dhanda, Commerce Minister, Holkar State, Representative of the Holkar State.
5. Representative of the Karachi Indian Merchants' Association.—Vacant.
6. Dr. B. L. Sethi, Deputy Director of Agriculture Western Circle, Aligarh.
7. Sardar Bahadur Sardar Beant Singh.
8. Sir Shri Ram, Representative of the Cotton Millowners of Delhi.
9. Representative of the Karachi Cotton Association Ltd.—Vacant.
10. Dewan Bahadur Sir T. Vijayaraghavacharya, K. B. E.
11. Dr. P. J. Gregory, Second Economic Botanist, Bengal.
12. Dr. V. K. R. V. Rao, Director of Statistics, Food Department, Govt. of India.
13. Mr. Camar Tyabjee, Managing Agent, Osman Shahi and Azamjahi Mills, Hyderabad (Deccan).
14. Sir Padampat Singhania, Senior Proprietor, Messrs. Jugilal Kamlapat, Cawnpore.
15. Mr. R. G. Saraiya, O.B.E., Messrs. Narandas Rajaram & Co., Bombay.

APPENDIX III.

SUB-COMMITTEES.

Standing Finance Sub-Committee.—Sir Chunilal B. Mehta (Vice-President), Chairman ; Mr. H. R. Stewart (President), (*ex-officio*) ; Sir Purshotamdas Thakurdas ; Sir Sorab Saklatvala ;Sir Chunilal V. Mehta ; Mr. J. L. Hurschler ; Mr. W. J. Jenkins ; Rao Bahadur Sir Madhaorao Deshpande and Mr. R. G. Saraiya.

Local Sub-Committee.—President (Mr. H. R. Stewart); the Vice-President (Sir Chunilal B. Mehta) ; Sir Purshotamdas Thakurdas ; Sir Sorab Saklatvala ; Sir Chunilal V. Mehta . Mr. J. L. Hursehler ; Mr. C. P. Bramble ; Mr. R.G. Saraiya ; Mr. W. J. Jenkins ; Mr. A. P; Darlow ; Rao Bahadur Sir Madhaorao Deshpande and Mr. S. T. More.

Agricultural Research Sub-Committee.—

I. *The President*—Mr. H. R. Stewart (*ex-officio*),

II. *The Vice-President*—Sir Chunilal B. Mehta (*ex-officio*),

III. *The Co-operative Banking Representative*—Sir Chunilal V. Mehta (*ex-officio*),

IV. *Cotton Growers' Representatives*—Sir William Roberts, Mr. Roger Thomas, Rao Bahadur Sir Madhaorao Deshpande, Rao Bahadur Uttamrao Patil,

V. *Cotton Trade Representatives*—Sir Purshotamdas Thakurdas, Mr. R.G. Saraiya Mr. J. L. Hurschler, Mr. C. P. Bramble, Mr. Y. G. Deshpande.

VI. *Agricultural Officers*—The Agricultural Commissioner with the Government of India (*ex-officio*), Mr. W.J. Jenkins, Mr. Malik Sultan Ali Noon, Mr.C. Maya Das, Mr. R. G. Allan, Rai Saheb Kalidas Sawhney, Mr. N. M. Deshmukh, Mr. R. H. Hill, Mr. V. Isvaran, Mr. M. J. Narasimhan, Rao Bahadur S. S. Salimath, Rao Bahadur V. A. Tamhane.

VII. *Additional Members*—Dewan Bahadur Sir T. Vijayaraghavacharya, Mr. Mohammad Afzal, Mr. K. Ramiah, Professor R. H. Dastur, Rao Bahadur V. Ramanath Ayyar, Dr. B. L. Sethi, Dr. R. Sankaran, Mr. S.S. Pande, Dr. V. G. Panse, Dr. B.N. Uppal, Dr. P. J. Gregory, Dr. H. K. Nandi, Dr. Nazir Ahmad, Mr. P. D. Gadkari, Dr. B. S. Kadam, Mr. L. Madhava Reddi, Mr. R. Balasubramaniam.

VIII. The Secretary.

Technological Research Sub Committee.—The President—Mr. H. R. Stewart (*ex-officio*), The Vice-President—Sir Chunilal B. Mehta (*ex-officio*), The Agricultural Commissioner with the Government of India (*ex-offieio*), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Sir Chunilal V. Mehta, Sir William Roberts, Sir Shri Ram, Sir Padampat Singhania, Mr. W. J. Jenkins, Mr. R. H. Hill, Mr. C. P. Bramble, Major S. R. Pocock, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Rao Saheb P. V. Deshmukh, Malik Sultan Ali Noon, Dr. Nazir Ahmad, Rao Bahadur V. Ramanatha Ayyar, Rai Saheb Kalidas Sawhney, Mr. Y. G. Deshpande, Mr. K. Ramiah, Mr. Roger Thomas, Dr. R. Sankaran, Dr. B.L. Sethi, Mr. Mohammad Afzal, Dr. K. Venkataraman, Rao Bahadur Uttamrao Patil, the Director of Industries, Bombay, The Principal, Victoria

Jubilee Technical Institute, Bombay, Mr. A. D. Walwyn and Mr. G. C. Abbott (Representing the Bombay Millowners' Association), Mr. Narottam P. Hutheesing and Mr. Rasiklal C. Nagri (Representing the Ahmedabad Millowners' Association) and Mr. Gatulal Rangildas and Mr. Jamnadas Ramdas (Representing the East India Cotton Association, Ltd.)

Cotton Forecast Sub-Committee—The President (*ex-officio*), The Vice-President, the Agricultural Commissioner with the Government of India (*ex-officio*), The Director of Commercial Intelligence, the Director of Agriculture, Bombay Province, the Director of Agriculture, Punjab, the Director of Agriculture, Madras, The Director of Agriculture, United Provinces, the Director of Agriculture, Central Provinces and Berar, the Director of Agriculture, Sind, the Director of Agriculture (Research), H.E.H. the Nizam's Government, the Commissioner of Agriculture, Baroda, the Director of Statistics, H. E. H. the Nizam's Government, the Director of Land Records, Central Provinces and Berar, the Director of Statistics, Calcutta, the Statistical Officer, Department of Industries and Commerce, Madras, Mr. J. L. Hurschler, C. P. Bramble, Sir William Roberts, Sir Chunilal V. Mehta, Mr. Roger Thomas and Dr. V. G. Panse.

Cotton Ginning and Pressing Factories Sub-Committee—The President—Mr. H. R. Stewart, the Vice-President—Sir Chunilal B.Mehta (*ex-officio*), the Co-operative Banking Representative—Sir Chunilal V. Mehta (*ex-officio*), Sir Purshotamdas Thakurdas, Sir Sorab Saklatvala, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Sir William Roberts, Mr. W. J. Jenkins, Rao Saheb P. V. Deshmukh, Major S. R. Pocock, Mr. C. P. Bramble, Mr. J. R. Marshall, Mr. R. H. Hill and Dr. Nazir Ahmad.

Standards Sub-Committee.—This Sub-Committee was not constituted as the preparation of Universal Standards has been held in abeyance for the duration of the war.

APPENDIX IV

STOCKS OF INDIAN COTTON ON 31st JANUARY, 1944, HELD BY THE MILLS AND THE TRADE IN MADRAS PROVINCE.

(In thousand bales of 400 lbs. each.)

Trade Descriptions of Cotton.	Mill stocks on 31st January					Trade stocks on 31st January					Total stocks on 31st January				
	1940.	1941.	1942.	1943.	1944.	1940.	1941.	1942.	1943.	1944.	1940.	1941.	1942.	1943.	1944.
Tinnevellies	20	18	27	31	17	2	14	17	15	18	22	32	44	46	35
Salems..	4	9	10	20	19	3	2	6	5	4	7	11	16	25	23
Cambodias	33	34	66	99	83	5	21	38	39	49	38	55	104	138	132
Northerns & Westerns	15	23	25	27	15	2	16	10	32	26	17	39	35	59	41
Cocanadas	1	1	4	3	3	8	9	19	5	19	9	10	23	8	22
Outside Cottons ..	49	56	61	55	84	..	..	4	1	5	49	56	65	56	89
Total ..	122	141	193	235	221	20	62	94	97	121	142	203	287	332	342

APPENDIX V

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS.

(Based on returns made under the Indian Cotton Cess Act, 1923, by mills in British India, and on voluntary returns from mills in Indian States).

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

——	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	†1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.
Bombay Island ..	766,375	664,546	611,606	565,084	491,709	687,287	664,199	636,720	782,815	750,317	634,149	982,084	1,057,745	1,270,766	1,199,172
Ahmedabad	344,021	321,503	322,257	348,009	373,345	326,558	320,982	304,398	346,269	346,375	305,459	341,800	414,870	364,999	428,677
Bombay Province ..	1,300,859	1,173,659	1,132,645	1,116,297	1,063,549	1,230,616	1,189,310	1,128,744	1,353,998	1,316,313	1,172,285	1,580,079	1,764,339	1,939,423	1,906,606
Madras Province ..	211,488	214,759	260,707	292,013	278,060	312,164	365,423	412,268	422,573	480,839	507,391	525,611	594,054	647,407	596,585
United Provinces ..	234,205	235,623	256,820	273,573	277,230	292,424	317,011	299,073	288,320	356,331	349,340	381,025	427,305	437,441	414,210
Central Provinces and Berar	123,146	118,492	115,018	111,208	112,660	125,014	130,298	122,987	146,587	164,616	142,868	153,825	178,791	174,385	148,020
Bengal..	99,075	91,993	102,390	103,784	107,633	101,101	98,892	79,944	92,546	90,611	111,383	135,227	125,740	136,098	138,203
The Punjab and Delhi.	64,464	73,736	89,681	80,854	71,939	83,897	89,430	93,886	94,742	133,347	165,274	171,652	179,987	182,104	184,950
Rest of British India .	24,458	27,101	30,342	31,935	35,139	38,575	38,010	35,823	46,840	49,806	44,867	47,316	64,804	59,003	52,242
Total—British India..	2,057,695	1,935,363	1,987,603	2,009,664	1,946,210	2,183,791	2,228,374	2,172,725	2,445,606	2,591,863	2,493,408	2,994,735	3,335,020	3,575,861	3,440,816
Total—Indian States.*	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375	730,970	678,645
TOTAL— INDIA ..	2,373,094	2,269,359	2,346,396	2,360,924	2,336,326	2,612,132	2,677,688	2,632,785	2,999,609	3,151,065	3,050,106	3,617,147	4,025,395	4,306,831	4,119,461

* Figures for Indian States up to and including 1930-31, being based on yarn production returns, include foreign cotton also.

† From April 1937, figures for Burma have been excluded.

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES.

(Based on voluntary returns from mills in Indian States).

N.B.—Figures up to and including 1930-31, being based on yarn production returns, include foreign cotton also.

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

—	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.
Hyderabad	20,823	23,074	31,290	33,488	33,231	45,588	51,771	49,981	63,093	68,156	67,095	72,860	83,725	83,689	78,204
Mysore	46,590	43,326	49,293	50,596	47,168	51,196	50,824	53,236	55,244	53,858	67,851	65,062	74,966	77,784	57,718
Baroda	59,043	62,578	58,534	50,587	53,612	57,146	51,963	51,761	70,686	73,278	65,573	91,519	90,642	87,542	88,628
Gwalior	41,463	45,207	45,892	43,306	49,362	56,318	72,163	79,079	89,243	94,090	88,688	95,517	94,300	90,025	93,152
Indore	83,026	88,620	95,296	91,036	111,430	114,229	113,379	106,454	147,766	140,792	120,186	138,795	148,867	149,914	144,147
Kathiawar States ..	64,454	20,283	18,849	18,868	26,506	35,438	37,397	42,717	48,545	44,109	43,703	50 479	60,628	72,857	70,577
Other Indian States ..		32,558	39,382	40,209	45,197	45,735	51,462	57,767	57,119	58,444	102,702	108,180	137,247	169,209	146,219
Pondicherry		18,350	20,257	23,170	23,610	22,691	20,355	19,065	22,307	26,475					
Total—Indian States.	315,399	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375	730,970	678,645

LOOSE (UNPRESSED) INDIAN RAW COTTON RECEIVED IN MILLS IN BRITISH INDIA.

(Based on voluntary returns furnished by mills.)

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

—	1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	‡1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.
Bombay Province ..	24,361	54,409	74,979	80,092	74,868	58,355	75,617	67,219	74,750	80,164	86,687	96,215	102,965	81,643	54,415
Madras Province ..	46,582	55,717	99,389	96,340	110,875	123,260	147,044	173,102	156,675	162,489	175,540	189,257	230,691	241,751	202,405
United Provinces ..	20,441	18,496	14,867	19,236	17,871	10,090	10,405	10,659	15,719	17,532	20,279	29,127	20,293	5,024	4,087
Central Provinces and Berar	16,243	15,771	20,743	17,462	18,382	20,544	27,502	26,321	32,860	26,980	29,052	32,589	31,178	19,153	7,366
Bengal*	..	..	..	..	..	..	..	90	..	..	8	..	..	483	5,000
The Punjab & Delhi†	4,361	4,307	2,317	2,149	..	5,535	3,110	28,885	23,873	25,960	33,079	28,627	30,986	22,638	15,319
Rest of British India*	..	..	..	..	..	..	..	19,282	17,160	22,916	12,734	15,529	21,280	6,804	4,942
Total—British India..	111,988	148,700	211,795	215,279	221,996	217,784	263,678	325,058	321,037	336,041	357,374	391,344	443,393	377,496	293,534
Indian States* ..	..	..	..	..	..	..	..	131,149	109,003	122,078	116,962	131,657	118,660	83,372	78,882
Total—INDIA* ..	..	..	..	..	..	..	..	456,207	430,040	458,119	474,336	523,001	562,053	460,868	372,416

*Figures up to 1935-36 not compiled.

† Figures up to 1935-36 exclude Delhi.

‡ From 1936-37 the figures refer to consumption and not receipts and are based on returns furnished under the Indian Cotton Cess Act, 1923, by mills in British India and on voluntary returns from mills in Indian States. From April 1937, figures for Burma have been excluded.

TWENTY-FOURTH
ANNUAL REPORT
OF THE
INDIAN
CENTRAL COTTON COMMITTEE

for the year ended
31st AUGUST,
1945

PRICE, Rs. 2.

CONTENTS

PAGE

CHAPTER I.

Constitution, Aims and Objects 1

CHAPTER II.

Meetings 4

CHAPTER III.

Cotton Statistics. 11-21
Indian cotton situation—1944-45 11
Report on the staple length of Indian cotton crop 13
Demand for various types of Indian cotton 14
Stocks 15
Indian mill consumption 16
Exports 16
Statistics of cotton pressed 16
Unpressed (loose) cotton statistics 16
Statistics of cotton ginned 17
Improvement of cotton forecasts 18
Scheme for crop estimating survey on cotton in the Central Provinces and Berar. 18
Revision of classification of Indian cotton 20
Accuracy of the all-India cotton forecasts 20
Publications 21

CHAPTER IV.

Research 22-66
Research on Cotton Technology 22
Fundamental Research 25
Cotton Research in Provinces and States 32

(*i*) *Bombay.*—

(*a*) Broach Cotton Breeding Scheme 32
(*b*) Jalgaon Cotton Breeding Scheme 33
(*c*) Scheme for breeding wilt-resistant cottons in Surat area 34
(*d*) Scheme for improvement of Wagad cotton at Viramgam and Jagudan 34
(*e*) Scheme for improvement of cotton crop in Kaira district 36
(*f*) Scheme for interspecific hybridisation in cottons at Surat 37
(*g*) Scheme for improvement of Dharwar-American cotton 38
(*h*) Scheme for investigation of 'small-leaf' disease of cotton 39

(*ii*) *Sind.*—

(*a*) Scheme for production of long staple cottons in Sind 40
(*b*) Scheme for Cotton Jassid Investigation 41

PAGE

(c) Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan 42
(d) Scheme for bollworm investigation and clean-up campaign in Sind 44

(iii) *Punjab.*—
(a) Punjab Botanical Scheme 45
(b) Scheme for improvement of Punjab-American 289 F/K. 25 cotton 47
(c) Physiological Scheme 48
(d) Cotton Jassid Investigation in the Punjab 51

(iv) *Central Provinces and Berar.*—
Central Provinces and Berar Cotton Breeding Scheme 52

(v) *Madras.*—
(a) Scheme for Improvement of Mungari cotton in Madras Province .. 54
(b) Scheme for Improvement of Cocanadas cotton in Madras Province 55

(vi) *United Provinces.*—
United Provinces Botanical Scheme 57

(vii) *Bengal.*—
Scheme for cultivation of long staple cotton in Bengal 58

(viii) *Baluchistan.*—
Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan 59

(ix) *Hyderabad State.*—
(a) Gaorani Cotton Improvement Scheme 60
(b) Scheme for Improvement of cotton of Oomras tract in Hyderabad State 62
(c) Scheme for improvement of Kumpta cotton 63

(x) *Baroda.*—
Scheme for improvement of Mathio cotton at Amreli 65

(xi) *Mysore State.*—
Scheme for breeding Sea Island & Egyptian cottons in Mysore .. 65

CHAPTER V.

Extension Work in Provinces and States 67-84

Bombay.—
(a) Surat Seed Distribution Scheme 67
(b) Scheme for Selection 1A cotton 68
(c) Jarila Seed Distribution and Extension Scheme 69
(d) Deccan Canals (Jarila) Seed Distribution Scheme 70

PAGE

(e) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme .. 71
(f) Scheme for cultivation of 1027 A.L.F. cotton in Nawapur Taluka .. 72
(g) Scheme for Multiplication and Distribution of 'Vijaya' cotton in Middle Gujerat 73
(h) Scheme for Multiplication and Distribution of 'Wagotar' cotton in Ahmedabad District 73

Sind.—

(a) Seed Distribution and Extension Scheme 74
(b) Financing of Seed Distribution 75

Central Provinces and Berar.—

(a) Verum Seed Distribution and Marketing Scheme 77
(b) Scheme for Distribution and Marketing of Jarila cotton in Central Provinces and Berar 78

Madras—

(a) Co. 3 Seed Distribution Scheme 78
(b) Scheme for Distribution of H. 1 strain in the Westerns area .. 79
(c) Maintenance of nucleus of pure seed of improved varieties of cotton. 80

United Provinces.—

Scheme for Distribution and Extension and Marketing of Perso-American cotton in Western United Provinces 80

Baroda State.—

(a) Baroda (Navsari) Seed Distribution Scheme 81
(b) B. 9 Seed Distribution Scheme 82
(c) Scheme for creation of a pure Wagad Zone in Mehsana District in Baroda State 83
(d) Scheme for distribution & multiplication of Vijaya cotton 84

CHAPTER VI.

Progress in the Introduction of Improved Varieties of Cotton 85-107
(i) Bombay 88
(ii) Sind 94
(iii) Punjab 95
(iv) Central Provinces and Berar 97
(v) Madras 97
(vi) United Provinces 102
(vii) Hyderabad State 103
(viii) Baroda State 105
(ix) Rajpipla State 106
(x) Mysore State 107
(xi) Gwalior State 107

CHAPTER VII.

		Page
Cotton Marketing, Legislation and other Protective Measures		108-116
(*i*)	Increased use of Indian cotton in mills in India	108
(*ii*)	Inclusion of Indian Cotton in the proposed post-war Universal Contract	108
(*iii*)	Cotton baling hoops	109
(*iv*)	Reversion to pre-war lashings of cotton bales	110
(*v*)	Fuel requirements of ginning and pressing factories	110
(*vi*)	Dismantling of cotton ginning and pressing factories	111
(*vii*)	Fixation of separate floor and ceiling prices for Co.$_3$ & Co.$_4$ cottons	111
(*viii*)	Supply of iron for agricultural purposes	112
(*ix*)	Regulated cotton markets	112
(*x*)	Agmarking	113
(*xi*)	Universal standards	113
(*xii*)	Legislation to maintain the purity of cotton and other protective measures	113
	(*a*) Cotton Transport Act	114
	(*b*) Cotton Ginning and Pressing Factories Act	114
	(*c*) Prevention of introduction of foreign cotton pests	115
	(*d*) The Red (Sudan) Bollworm (Diparopsis castanea) and other pests	116
	(*e*) Cotton Control Act	116

APPENDICES

I.	Members of the Indian Central Cotton Committee	117
II.	Sub-Committees	119
III.	Statement of receipts and payments for the year ended 31st March, 1945, Balance Sheet as at 31st March, 1945	121
IV.	Stock of Indian cotton on 31st January, 1945, held by the mills and the trade in Madras Province	137
V.	Indian raw cotton consumed in Indian mills	138

INDIAN CENTRAL COTTON COMMITTEE

ANNUAL REPORT

CHAPTER I.

CONSTITUTION, AIMS AND OBJECTS

The Indian Central Cotton Committee was established by the Government of India in 1921, in pursuance of the recommendations of the Indian Cotton Committee of 1917-18. At first, the Committee was purely an advisory body but, with its incorporation under the Indian Cotton Cess Act in 1923, it became an administrative body having at its disposal funds for the improvement and development of the growing, marketing and manufacture of cotton in India. These funds are derived from the cess of 2 annas (4 annas for the first three years) levied on every bale of Indian cotton exported from or consumed in mills in British India, the underlying principle being that special expenditure for the benefit of a particular industry should be borne by that industry. Of the total receipts of the Committee up to the 31st March, 1945, amounting to Rs. 1,96,22,249-15-6 Rs. 1,59,26,017-12-11 represent collections from the cotton cess. The funds at the disposal of the Committee are allotted for research into cotton problems mainly of all-India importance and for the development, extension and marketing of improved varieties of cotton. The policy followed in this regard is to supplement and not supplant the work of the Agricultural Departments in the cotton growing provinces and States, and, though, as a matter of convenience, certain lines of demarcation have been laid down regarding the investigations which the Committee considers most appropriate for its grants, as a general rule assistance is given in the directions where it is most needed in the carrying out of a co-ordinated policy of cotton improvement. Until 1937, the entire expenditure on the various schemes was borne by the Committee but, in view of the gradual depletion of its reserves owing to annual expenditure exceeding income, it was decided that the Provincial Governments and States, in future, should accept increasing responsibility for such of the schemes financ-

ed by the Committee as, at the end of their sanctioned period, were found to have produced results of definite value, in order that the savings thus effected may be utilised by the Committee for extending its activities in other useful directions. The Provincial Governments and States have since borne an increasing share of expenditure on the schemes of the Committee. Touch is maintained with the work done under the various schemes by means of annual progress reports submitted by the officers in charge of schemes. These reports are critically examined by the appropriate Sub-Committees which make suggestions regarding the future conduct of the work on the schemes. While the Committee's constitution ensures a broad outlook on all matters falling within its purview, its primary concern is the interest and welfare of the cotton grower. In this connection, it should be mentioned that the Committee's work is greatly facilitated by the co-operation it always receives from the various trade associations and by the readiness with which they respond in the matter of giving effect to recommendations designed to benefit the cotton growers. Under the Indian Cotton Cess Rules, members, who are not *ex-officio* members, hold office for three years and one-third of their number retire each year in rotation. The term of office of additional members appointed by the Governor-General under Section 4(xi) of the Indian Cotton Cess Act is three years or such lesser period as may be specified in the notification. A list of the members constituting the Committee and the various interests they represent as on 31st August, 1945, is given in Appendix I. The composition of the Sub-Committees as on 31st August, 1945, is given in Appendix II. The functions of the various Sub-Committees have been detailed in previous reports and it is not proposed to repeat them here beyond stating that the day to day administration of the Committee is carried on in consultation with the Standing Finance Sub-Committee which exercises its power under Rule 11 of the Rules under Section 16 of the Indian Cotton Cess Act, and is the principal executive body of the Committee.

The present is the twenty-fourth Annual Report of the Committee, covering the period 1st September, 1944, to 31st August, 1945. Despite all the difficulties arising from the war, good progress was maintained in each sphere of the Committee's activities. There was no change in the administration; Mr. D. N. Mahta continued

as Secretary of the Committee and Dr. Nazir Ahmad as Director of the Committee's Technological Laboratory. The receipts during the year amounted to Rs. 13,77,562/- and the total expenditure to Rs. 9,45,331/-. A statement of the receipts and expenditure as well as the Balance Sheet for the year as at 31st March, 1945, are contained in Appendix III. The Committee was represented on the Board of Governors of the Institute of Plant Industry, Indore, by Mr. H. R. Stewart, President, Sir Chunilal B. Mehta, Vice-President, Sir William Jenkins, Rai Saheb Kalidas Sawhney and Mr. D. N. Mahta (Secretary) during the financial year ending 31st March, 1945. During the same period, Mr. Roger Thomas represented the Committee on the Imperial Council of Agricultural Research. Under Article 51, as amended, of the Articles of Association of the East India Cotton Association, the Indian Central Cotton Committee is entitled to nominate from amongst its growers' representatives, three persons, whether members of the Association or not, not having dealings in forward contracts, as Directors of the Association. Rao Bahadur Sir Madhaorao Deshpande, Mr. L. Madhava Reddi and Mr. S. T. More were elected by the Committee as its representatives for the cotton year 1944-45.

CHAPTER II

MEETINGS

The full Committee usually meets twice a year, but most of the detailed work is carried on with the help of Sub-Committees appointed annually which hold office from the 1st April. This arrangement is necessary for the disposal of business which, otherwise, would remain pending till one of the half-yearly meetings of the full Committee, and it also lightens considerably the task of the main Committee. Two meetings of the Indian Central Cotton Committee were held in the year that has elapsed since the last report was issued. The first meeting was held at Bombay on the 26th and 27th January, 1945, Mr. H. R. Stewart presiding. At this meeting, the most important subject considered was that relating to planned production of cotton on an all-India basis. At the previous meeting of the Committee a Planning Sub-Committee had been appointed to examine this subject in detail and report on the part which cotton should play in the planning of agricultural production in the country and to work in close collaboration with the proposed Central Crop Planning Council. The Planning Sub-Committee had met on the 16th and 17th November, 1944, and again on the 23rd January, 1945, and the Committee thus had before it the report and recommendations of the Sub-Committee. The report revealed that Provincial Governments and Indian States had already reduced or were proposing to reduce in the 1944-45 season the acreage under cotton by 2 million acres as against 3,100,000 acres (2 million acres under short staple cotton and 1,100,000 acres under low-grade medium staple cotton) recommended by the Planning Sub-Committee. After extended discussion, the Committee accepted the recommendations of the Planning Sub-Committee in full. These recommendations were accordingly forwarded to the Government of India who were requested to take early steps to give effect to the short-term proposals for 1945-46. Briefly, the Committee recommended that for the 1945-46 and 1946-47 seasons

(a) the 1942-43 all-India cotton area of 19.2 million acres should be reduced by about 3.0 million acres, thus providing for a maximum cotton area of 16.2 million acres in each of

these two years, the plan for 1946-47 to be revised, if necessary, in the light of the circumstances that may prevail at the end of 1945-46 season,

(b) as between the different classes of cotton, the total reduction of 3.0 million acres should be apportioned as follows:—

2.0 million acres in short staple cottons,

1.0 million acres in low-grade medium staple cottons.

The varieties of cotton proposed for reduction, the Provinces and States affected and the extent of the reduction proposed for each are shown below:—

Style of cotton	Provinces or States.	1942-43 area	Extent of reduction proposed by the Committee	Maximum area proposed for 1945-46 and 1946-47 (Col. 3—Col. 4).
1	2	3	4	5
			In lakhs of acres.	
	SHORT STAPLE.			
Bengals.	United Provinces	3.11	1.08	2.03
	Rampur State	.06	.02	.04
	Punjab (British districts)	7.35	3.01	4.34
	Bahawalpur State	.37*	.14	.23
	Patiala State	1.43*	.59	.84
	Jind State	.19	.07	.12
	Nabha State	.19	.04	.15
	Faridkot State	.13	.06	.07
	Kapurthala State	.08	.04	.04
	Malerkotla State	.04	.02	.02
	Sind (British districts)	.64	.04	.60
	Khairpur State	.04	.01	.03
	Rajputana States	2.40	.76	1.64
	Ajmer-Merwara	.10	.04	.06
		16.13	5.92	10.21
Oomras	Hyderabad State	14.40	5.20	9.20
	Central Provinces and Berar	6.90	2.50	4.40
	Holkar State	4.57	1.64	2.93
	Gwalior State	.03	Nil	.03
	Rajputana and other Central India States	1.80	.65	1.15
	Bombay Province	2.30	.80	1.50
		30.00	10.79	19.21

*Estimated. Exact figure not available in this office.

Style of cotton	Provinces or States.	1942-43 area	Extent of reduction proposed by the Committee	Maximum area proposed for 1945-46 and 1946-47 (Col. 3—Col. 4).
1	2	3	4	5
Westerns	Hyderabad State	3.30	.60	2.70
	Madras Province	†..	.60	†..
		3.30	1.20	2.10
Kathiawar short staple (Mathio)	Western India States Agency ..	2.20	.98	1.22
	Baroda State	0.50	.22	.28
		2.70	1.20	1.50
Warangal and Cocanadas	Madras Province	1.10	.50	.60
	Hyederabad State	1.00	.30	.70
		2.10	.80	1.30
	Total Short Staple		19.91	

† Included under medium staple.

LOW-GRADE MEDIUM STAPLE

Dholleras	Bombay Province	4.40	1.25	3.15
	Western India States Agency and Cutch	5.39	1.05	4.34
	Baroda State	1.01	.20	.81
		10.80	2.50	8.30
Malvi.	Holkar State	1.05	.14	.91
	Gwalior State..	4.44	Nil	4.44
	Rajputana and other Central India States	2.21	.29	1.92
		7.70	0.43	7.27
C. P. & Berar Verum	Central Provinces and Berar ..	20.80	3.00	17.80
Khandesh Oomras (Medium).	Bombay Province	8.00	1.00	7.00
Broach	Bombay Province	2.87	.20	2.67
	Baroda State	3.41	Nil	3.41
	Gujerat States	.88	.06	.82
		7.16	.26	6.90
Bijapur and Bagalkot Jowari	Bombay Province	3.60	1.00	2.60
Westerns (Medium)	Madras Province	7.20*	2.00	5.02*
Total Low-Grade Medium Staple	.. .. ..		10.19	
	GRAND TOTAL ..		30.10	

*Includes short staple.

In distributing the reductions between the different styles and regions, the following principles were laid down by the Committee as essential:—

(i) There should be no increase in areas under styles not proposed for reduction over the area in 1942-43 or 1943-44, whichever is less. As regards American cotton in Sind, the Committee agreed that no limitation need be imposed.

(ii) Irrigation water should not be supplied for the production of short staple cotton in canal irrigated tracts.

(iii) The reduction proposed in the different administrations should be enforced compulsorily.

(iv) Provinces and States which are compelled to reduce the area under cotton and which, as a consequence, will not produce sufficient cotton seed for cattle feed should be allowed to import cotton seed freely from surplus cotton seed areas.

(v) In order further to make the growing of short and low-grade medium staple cottons less profitable, the mixing of cotton should be prohibited immediately by central legislation which should be strictly enforced.

The position arising from the proposed grant of a subsidy on American cotton exports was also considered at the same meeting, and, after prolonged discussion, the following resolution was unanimously passed:—

"The Indian Central Cotton Committee notes with grave concern that the U.S. cotton export programme providing for the grant of a subsidy of 4 cents per pound on exports of American cotton has been put into operation. In its opinion, this action of the U.S. Government is against the spirit of the resolutions passed by the United Nations Conference on Food and Agriculture, held at Hotsprings in 1943 and at the International Business Conference held in New York in November 1944. The subsidy has affected and will continue to affect adversely the prices of Indian cotton and consequently the interests of the cotton growers of this country. The Committee, therefore, requests the Government of India to take up the matter with the Government of the U.S.A. with a view to securing the abolition of the subsidy at an early date. The Commit-

tee suggests further that should any International Cotton Conference be held, India should be represented on it and that in the selection of India's representatives as well as in giving them any instructions in the matter, the Indian Central Cotton Committee should be consulted."

The question of placing the finances of the Committee on a sound basis was another subject which received considerable attention at this meeting, and the following resolution was unanimously passed:—

"In view of the fact that the income of the Committee is insufficient to cover even its existing normal yearly expenditure, let alone expenditure which increase in research, seed distribution, ginning experiments and other activities would involve, rather than depend on Government meeting the deficit from time to time or giving a grant from the Cotton Fund, this Committee recommends that from the 1st September, 1945, the Cotton Cess should be raised from 2 annas to 4 annas per bale."

After considerable discussion, it was further agreed that steps should be devised for collecting the cess also from mills situated in Indian States which hitherto were exempt from such payment.

Another resolution passed at this meeting recommended that steps should be taken for the early import of new or reconditioned textile machinery from the U.S.A. or the United Kingdom in order to solve the twin problems of reducing the large surplus of short-staple cotton and relieving general shortage of cloth and yarn in the country. The resolution further urged that concessions in the matter of taxation should be afforded to mills.

The second meeting of the year was held in July 1945, again at Bombay, and was presided over by Mr. H. R. Stewart, C.I.E., Vice-Chairman of the Imperial Council of Agricultural Research. The most important subject affecting the interests of cotton growers which came up for consideration at this meeting was that relating to the question of floor and ceiling prices of cotton for the 1945-46 season. In the course of the debate, the Government of India's approach to the problem was criticised and the view was expressed that unless and until the cost of living and the cost of production were materially lowered, there was absolutely no justification for reducing the floor prices further by Rs. 50/-, i.e., from Rs. 350/- to

Rs. 300/-. It was argued that even in the previous year the Committee had given it as its considered opinion that the view that cotton floors should provide no more than a very small margin of profit to cotton cultivators was not consonant with providing a reasonable living to the cultivator. It was pointed out that the price of raw cotton was disproportionately low compared with the prices of textiles, piecegoods and yarn and that, in any case, nothing had happened since July 1944, when the floor was reduced from Rs. 400/- to Rs. 350/-, to warrant any further reduction; on the other hand, production costs, particularly labour wages, prices of fertilisers, implements and plough-cattle had risen appreciably and there was thus a strong case for raising the floor prices by Rs. 50/- to help the growers to balance their budget. It was urged that the Committee should not be a party to any scheme which prevented the destitutes from improving their position. After extended discussion, in which representatives of cotton growers, millowners and the trade took part, the following resolution was unanimously passed:—

"The Indian Central Cotton Committee is of the opinion that during the season 1944-45 cotton cultivators have suffered heavy losses owing to:

(1) substantial reductions of premiums for 1944-45 in a number of varieties compared with 1943-44,

(2) short crop resulting from heavy reduction in cotton acreage as per Government plan in order to carry out the "Grow More Food" campaign,

(3) average prices realised this season since 1st September, 1944, to 30th June, 1945, being below the average for the same period for the season 1943-44, and

(4) no reduction in the cost of living or in the cost of production.

The Committee, therefore, urges the Government of India that it is essential that the floor prices for all varieties of cotton for the 1945-46 season should be raised by Rs. 50/- per candy from the 1944-45 floor levels."

Another matter which received the attention of the Committee at this meeting was that relating to the question of the proposed international agreement for the production and export of cotton. The consensus of opinion was that in any such agreement India

should have her quota of cotton exports on the basis of such pre-war *pro-rata* percentages as may be given to other more important cotton exporting countries and that her production should be determined on the basis of such export quotas plus internal requirements. Arising out of the discussion on this subject, the question of Indian representation at International Cotton Conferences was also considered and it was resolved to recommend to the Government of India that at all future International Cotton Advisory Committees and Conferences the Indian delegation should include at least one non-official member of the Indian Central Cotton Committee and that in the matter of giving directions to the delegation the Indian Central Cotton Committee should be duly consulted.

The probable competition between cotton and synthetic fibres in the post-war years also engaged the attention of the Committee at this meeting. After much discussion it was agreed that the problem was one that demanded the earnest consideration of all cotton growing countries. It was accordingly decided that all available information should be collected and placed before the Committee, particularly regarding the position in America which, in this respect, was considered similar to India, both being cotton growing countries.

The Committee was informed at this meeting that the Government of India had accepted its recommendations regarding planned production of cotton and that these had been passed on by them with their support to the Provincial and State Governments concerned. This led to a prolonged discussion on the position of cotton seed and its reaction on the food situation and other relevant interests in the country. It was revealed that Sind was the only province which had a surplus of cotton seed which was of the order of 60,000 tons and that the other provinces were all deficit provinces in this respect except the Hyderabad State which considered that its requirements just balanced production. The Committee was informed further that with the exception of two provinces, *viz.*, Madras and Sind, export of cotton seed had been prohibited in all other provinces. In view of the importance of the subject, it was decided that the matter should come up for detailed examination when the question of planning cotton production for the 1945-46 season is considered.

CHAPTER III

COTTON STATISTICS

The work of collection, compilation, analysis and comparative study of cotton statistics was continued along the lines of the past year. The total area under cotton in India during the year under review was 14,839,000 acres, showing a decrease of 6,24,700 acres or 29.6 per cent as compared with the previous year. The acreage during the season was the lowest on record due mainly to the "Grow More Food" campaign. The Bombay Province, where reduction of the area under cotton in certain tracts was made compulsory under the "Bombay Growth of Food Crops Act," and Hyderabad State accounted for a decrease of 2,029,000 acres or 32.5 per cent and 2,148,000 acres or 34.4 per cent respectively of the total all-India reduction. The balance of the reduction was distributed amongst all the other cotton growing Provinces and States. The total estimated outturn for 1944-45 was 3,542,000 bales, against 5,258,000 bales in 1943-44 and was the smallest on record since 1911-12 when the production was 3,288,000 bales.

INDIAN COTTON SITUATION—1944-45

The weakness displayed by the market during the close of the last season when cotton prices touched the floor level continued during the first three weeks of September, 1944. Thereafter, consequent on the satisfactory progress of the war in Europe, the market passed through a sudden wave of optimism which, however, was short-lived. Following the reports about U.S. plans for providing full parity price for its cotton growers and for the disposal at the same time of 10 to 15 million bales in the world markets at competitive prices, Jarila (March) rapidly declined from Rs. 442/- on the 23rd September to Rs. 419/- on the 29th September. During the following month, the market ruled easy on account of the announcement of the grant by the U.S. Government of a subsidy on cotton exports. The market opened at Rs. 421/- on the 3rd October and closed at Rs. 410/- towards the end of the month, after touching the lowest level of the month at Rs. 393/- on the 14th October. Prices during November were on the whole steady around the level

of the closing quotation of the previous month. The quotation during December showed a definite upward trend which took Jarila (March) to Rs. 449/- on the 9th December. After a temporary reaction, prices again recovered and closed at Rs. 443/- on the 30th December. The quotation was marked up to Rs. 463/- on the 27th January owing to a steady improvement in ready and upcountry markets, the holding movement in the interior and the prospects of early peace in Europe. In the absence of fresh support, the bullish fervour subsided towards the end of January with Jarila (March) dropping to Rs. 444/- on the 31st January. In sympathy with the improvement in the spot market, futures prices in February were steady, the quotation on the 28th February being Rs. 444/-, the same as at the end of the previous month. The steady tone continued during the next month, aided by mill buying of staple varieties. The quotation for Jarila (March) opened at Rs. 448/- on the 1st March and after advancing to Rs. 453/- on the 5th, sharply dropped to Rs. 438/- on the 12th March. Thereafter, the market firmed up with good support at lower levels and March delivery prices recovered to Rs. 457/- on the 23rd to mature steady at Rs. 450/- on the next day. The end of March witnessed the quotation for Jarila (May) standing at Rs. 448/-. In spite of favourable war news and foreign enquiries, the market displayed a sagging tendency during the first half of April which took the quotation to Rs. 409/- on the 12th April. With the publication of the Third All-India Cotton Forecast which confirmed the smallness of the crop, the price of Jarila (May) advanced to Rs. 417/- on the 13th April. During the latter half of April, prices sagged and Jarila (May) came down to Rs. 397/- on the 27th April. Further downward tilt was checked by fair all-round support and Jarila (May) steadied to Rs. 409/- on the 30th April. During May, persistent peace rumours imparted a bullish feeling but reports of the U.S. Government's offer for sale of about one million bales of cotton had a depressing effect on the market. The price of Jarila (May) matured on the 25th May at Rs. 412/-. The market ruled steady during June, under the influence of continuing mill interest in staple varieties, encouraging export demand for medium and staple varieties and the smallness of the crop as confirmed by the Fourth All-India Cotton Crop Forecast. Prices of raw cotton in June were generally on a higher level than in the

preceding month. The quotation for Jarila (July) stood at Rs. 421/- on the 30th June. During the greater part of July, prices were depressed by persistent rumours regarding the possibility of the floor prices being reduced for the 1945-46 season, the quotation on the 23rd July standing at Rs. 413/-. A steadier tone prevailed thereafter and on the 25th of that month, July delivery matured at Rs. 419/-. The quotation for September delivery stood at Rs. 430/- on the 25th July. The fixation of floor and ceiling prices for Jarila for the 1945-46 season at Rs. 350/- and Rs. 530/-, respectively, lent considerable strength to the market, resulting in a further rise in the quotation for September delivery at Rs. 433/- on the 7th August. With the sudden termination of hostilities in the Far East, however, the rising trend was reversed and the quotation dropped eventually to the floor level towards the close of the season.

Turning to the statistical position of Indian cotton, the season started with an estimated carry-over of 34.4 lakhs bales (400 lbs. net each) with the trade (excluding spinning mills). On the basis of the figures of cotton pressed and unpressed cotton consumed in mills, the actual crop in 1944-45 is estimated at about 40.5 lakhs bales (excluding extra-factory consumption of 4.5 lakhs bales), of which 30.8 lakhs bales are estimated to have been of staple length 7/8″ and above. The receipts at mills of Indian cotton during the season amounted to 39.8 lakhs bales (400 lbs. net each), of which 27.6 lakhs bales were of staple length 7/8″ and above. The total exports amounted to 4.1 lakhs bales, of which it is estimated 1.3 lakhs bales were of staple length 7/8″ and above.

On the basis of the figures of actual production, mill receipts and exports, the carry-over of Indian cotton with the trade, excluding spinning mills, at the end of the season, is estimated at 30.5 lakhs bales as shown below:—

	In lakhs of bales of 400 lbs. net (excludes extra-factory consumption).		
	Total	7/8″ and above.	Below 7/8″.
Estimated stocks held by the trade (excluding spinning mills) on 31st August, 1944	33.9	10.8	23.1
Probable production in 1944-45	40.5	30.8	9.7
Total supply ..	74.4	41.6	32.8
Receipts at mills in 1944-45	39.8	27.6	12.2
Exports during 1944-45	4.1	1.3	2.8
Total distribution ..	43.9	28.9	15.0
Estimated stocks held by the trade on 31st August, 1945	30.5	12.7	17.8

STAPLE LENGTH OF INDIAN COTTON CROP

A report on the estimated production of cotton according to staple length for the 1944-45 season was issued as usual. Of the official estimate of 3,542,000 bales (compared with the trade estimate of 3,714,000 bales), cotton of staple length 7/8″ and above formed about 66 per cent against 60 per cent in the previous year. There was a drop in the production of cotton of staple length over 1″ owing to the poor yield of 289F types in the Punjab due to adverse seasonal conditions.

DEMAND FOR VARIOUS TYPES OF INDIAN COTTON

Statistics relating to internal and export demand for various types of Indian cotton compiled from the information collected on a voluntary basis were published in Statistical Leaflet Nos. 3 and 4 (1944-45). The importance of such statistics to the trade and industry and to those entrusted with the responsibility of shaping and directing the cotton policy of the country has been stressed in previous reports. Receipts at mills of Indian cotton, during the season, were lower than those of the previous year by 130,000 bales, while exports were practically the same as last year. Mill receipts of Indian cotton of staple length "7/8 inch and above" dropped by 172,000 bales during the year, the offtake of short staple cotton (below 7/8″) being higher by nearly 42,000 bales as compared with the previous year. "Long and medium staple" and "short staple" cottons formed 29 and 71 per cent, respectively, of the total exports during the season, as compared with 57 and 43 per cent in the previous year.

In this connection it may be mentioned that the Committee have strongly recommended to the Government of India that the compilation from compulsory returns of monthly figures covering Indian mill consumption, stocks and receipts of the various descriptions of Indian and foreign cotton which is at present undertaken by the Cotton Movements Committee should be continued after the war as a permanent feature of cotton statistics.

STOCKS OF COTTON HELD IN THE COUNTRY

Concerted attempts were made during the year to collect the fullest information in respect of stocks of cotton held in the country on the 31st August, 1945, and the results were published in Statistical Leaflet No. 2 (1944-45). Trade associations, market committees and other authorities gave valuable assistance in the collection of this information and to them the thanks of the Committee are due. Stocks of Indian cotton held in India by the trade at the end of the season 1944-45 on the basis of voluntary returns, amounted to 30.7 lakhs bales. This figure is less than the corresponding estimate of a prominent cotton firm by some 2.4 lakhs bales whereas our figure for the 31st August, 1944, was lower than the trade estimate by some 12 lakhs bales. As compared with the estimated carry-over based on the figures of actual crop, exports, mill receipts, etc., the figure as collected by the Committee for the 31st August, 1945, shows a deficit of only 2.6 lakhs bales. This improvement in the position has been possible by the co-operation extended by almost all the major cotton growing Provinces and States in collecting the required statistics through local official channels. In view, however, of the importance of ensuring that these statistics are as complete as possible, the Provinces and States concerned have been urged to introduce legislation for the collection of the required information on a compulsory basis. In this connection, the Committee approved, with certain modifications, the draft Bill received from the Government of Sind for the collection of the statistics in question. A copy of the draft Bill together with the comments thereon of the Committee has been forwarded to other Provincial and State Governments with a request to introduce similar legislation in their territories as early as possible.

As the season adopted for the cotton crop of the Madras Province is the year ending 31st January, figures of stocks of cotton held in the province on this date are collected annually in addition to the figures relating to the 31st August. The relevant figures for the 31st January, 1945, together with comparative details for previous years, are given in Appendix IV.

INDIAN MILL CONSUMPTION

Figures of consumption of Indian cotton in mills in British India and Indian States for the years 1930-31 to 1944-45 based on the monthly statements issued by the Committee, are given in Appendix V. The total consumption of Indian cotton in mills in India during the season under report, viz., 4,158,664 bales, showed an increase of 39,203 bales as compared with the previous season. Out of this increase, mills in British India and Indian States accounted for 59 per cent and 41 per cent, respectively. Mills in Bombay Island, Madras Province and the Central Provinces and Berar and the Indian States of Mysore and Indore mainly contributed to the increased consumption. Among the areas recording reduced consumption, Ahmedabad accounted for the largest decrease.

EXPORTS

The exports of Indian cotton from British India during the season totalled 406,000 bales against 362,000 bales in 1943-44. On the average of the three financial years ending 1944-45, the value of cotton (including waste) exported from British India formed 20 per cent of the total value of export of "Raw materials and produce and articles mainly unmanufactured" and 5 per cent of the total value of all merchandise exported.

STATISTICS OF COTTON PRESSED

During the season under review, 2,703,161 bales of cotton were pressed in British India and 1,104 830 bales in Indian States, making a total of 3,807,991 bales for all-India; the corresponding figures for 1943-44 were 3,365.056, 1,608,078 and 4,973,134 bales, respectively. For India as a whole, the average net weight per bale of cotton pressed during the season under report amounted to 390 lbs., against 392 lbs. in the previous season.

UNPRESSED (LOOSE) COTTON STATISTICS

The statistics of cotton pressed do not account for the whole of the Indian cotton crop as, apart from the quantity utilised for extra-

factory consumption, chiefly in the form of *kapas*, mills situated near cotton growing areas often use considerable quantities of ginned, unpressed cotton. During the year, 336,230 bales of unpressed cotton were consumed in mills in India against 372,416 bales during the preceding year. The relevant figures for the years 1930-31 to 1944-45 are given in Appendix V to this report.

STATISTICS OF COTTON GINNED

The figures of cotton pressed do not cover the entire crop as, apart from ginned unpressed cotton consumed in spinning mills for which figures are available, both ginned unpressed cotton and *kapas* are also utilised for domestic purposes, such as, hand-spinning, making of quilts, mattresses, etc., for which there are no reliable data. If ginning returns were instituted, all that would be required for arriving at the actual crop is a reliable estimate of the quantity of *kapas* used for domestic purposes. The ginning and pressing returns would, at the same time, serve as a check on each other. The submission of ginning returns is now in force in the Central Provinces and Berar, Bombay Province, Bengal, Sind, the United Provinces and Ajmer-Merwara and certain Indian States. The Governments of the Punjab and Madras have, by notification, brought into force the provisions of Section 5A of the Cotton Ginning and Pressing Factories Act, 1925, making it obligatory on all ginning factories in the respective provinces to submit weekly returns of cotton ginned in the prescribed form. For purposes of ginning as well as pressing returns in the Madras Province, the information would be required to be furnished under eight heads, viz., (1) Tinnevellies, (2) Nadam, Bourbon and Uppam, (3) Cambodia, (4) Karunganni, (5) Northerns, (6) Westerns, (7) Mungari and (8) Cocanadas. The form of return also provides for the collection of information regarding the quantity (by weight) of cotton ginned in terms of *kapas* as well as lint. As this would give valuable data regarding ginning percentage of the different varieties which would be helpful in estimating yields, the Committee recommended that the Madras form should be adopted by other provinces also when provision is made for obtaining details of the varieties of cotton ginned.

IMPROVEMENT OF COTTON FORECASTS

The all-India cotton forecasts of the 1943-44 season were, as usual, subjected to a post-mortem examination by the Cotton Forecast Sub-Committee of the Indian Central Cotton Committee, at the close of the season, with a view to detecting sources of errors and suggesting remedial measures. The actual crop for all-India during 1943-44 was estimated at 57.2 lakhs bales against 5,094,000 bales forecasted in April 1944. The discrepancy lay mainly in the forecast estimates of the United Provinces, the Punjab, the Central Provinces and Berar, Bombay Province, Rajputana and Mysore. The cotton forecast of the Hyderabad State was found to be an overestimate by 46 per cent of the actual. The attention of the forecasting authorities in the Provinces and States was drawn, where necessary, to the discrepancies between the forecasts and the estimated actual crop.

As in the past, the estimates of the cotton crop were received by wire from the Department of Commercial Intelligence and Statistics and released in Bombay at a time previously fixed to synchronise with the time of their release in Calcutta.

SCHEME FOR CROP ESTIMATING SURVEY OF COTTON IN THE CENTRAL PROVINCES AND BERAR

The object of this scheme is to provide a suitable technique for conducting crop-cutting experiments on cotton which form the most reliable direct basis for estimation of yield. The scheme was originally sanctioned by the Committee in July 1942 for a period of one year. It came into operation on the 15th October, 1942, the venue of experiments being the Akola district. At its meeting in July 1943, the Committee agreed to extend the scheme to the Buldana district for a period of one year. Crop-cutting experiments were accordingly carried out during the year under report in the Akola and Buldana districts for estimating the yield of cotton in the two districts. Side by side, arrangements were made to ascertain, by executive enquiries, the movement of loose cotton in and out of these two districts so that this information together with the statistics of cotton pressed already available could be used as an independent check on the result of the crop-cutting experiments. The reliability of yield estimates obtained from the crop-cutting

scheme was borne out by a comparison with the results obtained from the executive enquiries.

In July 1944, the Committee approved of the proposals received from the Director of Land Records, Central Provinces and Berar, for extending the scheme to the whole cotton tract of the Province for a period of one year in the first instance, the object being to determine accurately the average yield of *kapas* per acre and the total production for the whole of the cotton area in the Province, by the method of harvesting random plots. At the same time it was intended to train the staff of the Land Records and Revenue Departments in the practical working of the method so that the work could ultimately be taken over by these Departments as a routine procedure for carrying out crop-cutting experiments. The survey was carried out in all the four districts of Berar and in Nimar, Wardha and Nagpur districts of Central Provinces, Harda tahsil of Hoshangabad district, Warora tahsil of Chanda district and Sausar tahsil of Chhindwara district. In all, 34 tahsils covering 99¼ per cent of the cotton acreage in the Province were included in the scheme. Some 204 villages were selected at random ranging from 4 to 9 in each tahsil. In each village, 4 fields were selected and in each field, a plot of 1/10 acre in size (132′ x 33′) was located by a random procedure for harvest. The results of the survey indicated that the departmental estimate of 192.6 lbs. per acre over the whole province, according to the final forecast for the season was 11 per cent higher than the survey estimate and that the total forecasted production for the whole province was definitely an overestimate. In the course of the survey, opportunity was taken to record the plant number, boll number and weight of *kapas* per boll in one of the 4 plots selected in each village, in order to study the problem of obtaining reliable forecasts from the standing crop. The practicability of the survey method and trustworthiness of the results having been demonstrated by the work done during the past 3 years, it is now proposed to take the experiment to the final stage in 1945-46 in which the field-work would be organised to fit in with the administrative arrangements of the Revenue and Land Records Departments who are primarily responsible for the work, and entrusted completely to the staff of these Departments. Special attention would be given to two aspects, viz., (1) smooth and efficient

working of the organisation by noting and remedying any difficulties that might arise and (2) training of the departmental staff in the various details relating to the conduct of the survey. This would enable the Provincial Government to take up the crop-cutting survey as an annual routine. The most important modification proposed for 1945-46 is that the Revenue Inspector's circle, which is the administrative unit for area and yield statistics and of which there are 3 or 4 per tahsil, would form the ultimate sub-division for selection of random villages. So far, the tahsil has been treated as the stratum and villages were randomly scattered over the whole tahsil but, since in 1945-46, the Revenue Inspectors would be entrusted with the conduct of the crop-cutting experiments, it is necessary to distribute the villages evenly among the different revenue circles in order to make a convenient and equitable division of the field-work. The precise plan of the survey would thus be that 2 or 3 villages would be randomly selected in each Revenue Inspector's circle according to the cotton area in the circle. In each village 3 cotton growing fields would be selected and in each field a plot of 1/10 acre size (132′ long and 33′ broad) would be located in a random position for harvest.

REVISION OF CLASSIFICATION OF INDIAN COTTON

A draft scheme of classification of Indian cotton was drawn up during the year in consultation with the major cotton growing Provinces. The revised classification as approved by the Committee has now been referred to the Provinces and Indian States concerned for their concurrence and for defining, where more than one variety is grown, the exact delimitation of the areas under each variety. The Director of Statistics, Calcutta, has, at the same time, been requested by the Committee to prepare and publish, on the basis of the revised classification, a new varietal cotton map of India in consultation with this office.

ACCURACY OF ALL-INDIA COTTON FORECASTS

The publication of Statistical Leaflet No. 5 relating to the above has been suspended for the duration of the war, commencing with the issue for the 1941-42 season.

PUBLICATIONS

The following statistical publications were issued during the year under review:—

(1) Statistical Leaflet No. 2—Tenth Issue (1943-44), "Stocks of Indian raw cotton held in India by the mills and the trade on 31st August, 1944."

(2) Statistical Leaflet No. 3—Tenth Issue (1943-44), "Receipts at mills in India of raw cotton classified by varieties—1943-44 season."

(3) Statistical Leaflet No. 4—Tenth Issue (1943-44), "Exports by sea of Indian raw cotton classified by varieties—1943-44 season."

(4) Statistical Bulletin No. 13—"Supply and distribution of the various types of Indian cotton during the 1942-43 season."

CHAPTER IV

RESEARCH

The main line of work under the various research schemes of the Committee is plant breeding and selection. Its object is to enable the grower to secure the most profitable yield. To do this there have to be taken into account (a) the quality of the lint on which demand and prices depend, and (b) yield. A number of research schemes among which the most important are those for cotton breeding for the improvement of quality, are in operation in the various cotton growing Provinces and States. The majority of these schemes are financed entirely by the Committee, while the cost of others is borne partly by the Committee and partly by the Provincial Government or State concerned. The Committee also makes grants to Departments of Agriculture in the various cotton growing Provinces and States for specific investigations on cotton, not necessarily confined to breeding new varieties. The aim is to arrange for a well-directed co-ordinated effort for the improvement of every aspect of cotton in India. Since January 1943, the expenditure on new schemes and extensions of old schemes sanctioned by the Committee, which are for the benefit of cotton growers, is being met from the Cotton Fund at the disposal of the Government of India. Research on cotton technology is carried on at the Committee's Technological Laboratory and in addition, trained Technological Assistants are posted at the Cotton Research Stations at Lyallpur, Mirpurkhas, Cawnpore, Surat, Dharwar, Coimbatore and Nanded, to help the botanists in charge in their work of breeding improved varieties of cotton.

RESEARCH ON COTTON TECHNOLOGY

Research on cotton technology, ginning and the testing of cotton fibres, yarns and cloth are carried on at the Technological Laboratory at Matunga. A brief summary of the work done during the year is given below; full details are given in the Annual Report of the Laboratory which is issued as a separate publication.

The research and testing activities of the Laboratory were maintained at the levels attained in the previous years. Valuable

assistance was rendered to cotton breeders by helping them to select types which would bring higher monetary return to the cultivator and prove more acceptable to the trade and the industry. Similarly, the interests of the latter were served by carrying out tests for them on trade varieties and Standard Indian cottons and by giving them technical advice. Tests were also made on samples received from foreign countries like Uganda, Belgian Congo, etc., whose cottons are used in Indian mills. Several *ad hoc* investigations relating to the processing of cottons were carried out on behalf of the mills. The total number of samples received for tests rose from 1,514 in the last year to 1,685 in the current year, on which 330 reports were issued. Several Indian States, in which cotton is grown on a large scale took advantage of the facilities offered by the Laboratory.

Among tests carried out on agricultural samples, mention might be made of a new selection M5A, at Nagpur distinctly superior to V. 434 or Jarila, progenies evolved at Mirpurkhas with staple length of 1-1/16", Malvi Upland 4, irradiated with X-rays resulting in longer staple and better spinning performance, S31 (now called Pratap) which is found specially suitable for the Kathiawar States. Tests were also made on Vijaya cotton grown at different centres in Baroda district and Middle Gujarat, and on samples of Jarila cotton grown from the seeds of irrigated and dry crops which did not confirm the general impression among the cultivators in Deccan that seeds from irrigated crop do not give as good yield as those from the dry crop.

Spinning tests were made, as usual, on representative standard and trade varieties of Indian cottons, the results of which were published for the general information of the trade and the industry in technological bulletins and circulars.

The Testing House section rendered valuable service by carrying out tests on 523 samples of cotton, yarn and cloth for cotton firms and mills. These included spinning tests on 68 samples, fibre tests on 172 samples, yarn tests on 133 samples and cloth tests on 149 samples. Among the *ad hoc* investigations mention might be made of tracing the defects in the weaving of certain cloths, causes of poor performance in the processing of cottons, causes of stains in mill products and means for removing them. In one such investi-

gation fibre tests on flat strips and fly obtained by placing the stripping comb on the licker-in side showed that they have higher percentage of short and lower percentage of long fibres than when the comb is placed as in the ordinary process.

With a view to improving the pre-cleaning and ginning of Indian cottons experiments were carried out to study the effect of saw-speed in the saw gin and overlap settings in roller gins on the ginning percentage, output, quality of ginned lint, etc., and leaflets were published on each variety. Since some difficulty had been experienced by ginners with Buri cotton, experiments were made with different sizes of grid, and it was found that a grid of either 6/16" or 7/16" with an overlap of 3/16" in a single roller gin would yield the best results. An investigation on the causes of difference, if any, between the spinning performance of saw-ginned and roller-ginned samples of the same cottons is also under progress.

Good progress was made in the technological investigations, some of which are of fundamental nature while others are of direct practical value to the trade and the industry. Tests on combing of good quality Indian cottons showed that after combing to the extent of 16-18 per cent, some of the good quality Indian cottons yielded yarns which are comparable in strength to Kampala carded yarns. It was found that 60 to 70 per cent of the improvement in quality on combing was due to improvement in mean length and length regularity of the combed stock. Experiments with different front roller speeds of the draw frame showed that the highest speed (525 r.p.m.) gave the best for long staple cottons, intermediate speed (475 r.p.m.) for medium staple cottons and the lowest speed (375 f.p.m.) gave the best test for long staple cottons, intermediate speed been developed by means of which a 2 lb. sample can be spun, yielding results which are comparable with the normal samples. New formulae have been evolved which give a better prediction of the spinning value of Indian cottons from fibre-properties. Tests on *arboreum* cottons showed that swollen diameter or fibre-weight may be used with equal advantage in predicting their spinning value. Experiments with different speeds of beater and fan in the crighton opener gave the optimum conditions for working this machine with good quality Indian cottons. The investigation in connection with the determination of maturity coefficients for Indian

cottons was completed. A new apparatus useful for measuring the diameter of fine wires, hair, wool fibres, artificial silk filaments, cotton lint, etc., was designed and fabricated. Bulletins, on the bleaching of cellulose in linters and the analysis, grading and utilisation of Indian linters were published.

In addition to the above investigations, work is in progress on the causes of neppiness in cotton yarns, spinning quality of mixings of Indian cottons with special reference to fibre-properties, influence of different fibre-length groups on yarn-strength, comparison of different methods of measuring halo-length, prediction of strength of yarn spun with different twist multipliers, effect of different agronomical factors on fineness of cotton, size absorption capacity of different Indian cottons, preparation of tyre cards from Indian cottons, effect of storage on Jarila, V. 434 and Vijaya cotton, etc.

FUNDAMENTAL RESEARCH

Fundamental research on cotton is carried out at the Institute of Plant Industry, Indore, which was established with the object of providing a central research station in the black soil areas of the Malwa Plateau. In April 1940, the working of the Institute was reorganised as a result of which fundamental research on genetics and plant breeding, physiology and field plot technique is carried out under a special scheme—the Cotton Genetics Research Scheme. An annual subsidy of Rs. 30,000/- is, however, given to the Institute for work on other crops for the Member-States, as well as for seed multiplication, distribution and demonstration and such agronomical and chemical investigations as might be considered necessary for the benefit of the States. The work of the Institute, viz., varietal tests and seed multiplication, followed the lines of the previous years. A detailed account of this work is published separately in the Annual Report of the Institute. A review of the progress made during the year under the Cotton Genetics Research Scheme is given below:—

1. (a) Genetics

Genetical studies on fuzz grades in *G. hirsutum* have confirmed the simple dominance of tufted over fuzzy condition only when the parents belong to the same variety. It has been demonstrated

for the first time that even varieties of the same species can differ in their modifier background with regard to fuzz genes. It has also been shown that the dominance of tufted condition can be reversed and fuzz grades even beyond 10 can be obtained by the action of modifiers.

The repetition of X-ray experiment with M.U.4 has confirmed the previous results, namely, that by exposing the seed to X-rays and selecting from the X_2 progeny, individuals with high means for ginning percentage and halo-lengths new varieties can be built up which are an improvement over the untreated seed. The repeat consisted of selfed seed from a single plant of which 1/3 was treated with X-rays for 10 minutes, another 1/3 treated for 20 minutes. and the balance kept as control. Equal number of progenies from the control and from the X_2 of the 10 minutes and 20 minutes treated seed were grown in a replicated experiment and it was found that while the general means of the three groups did not show any appreciable difference either in ginning percentage or halo length one or two individual progenies in the treated seed gave very much higher values for these characters. A replicated experiment with X_3 progenies has again shown that the progenies with the highest values for ginning percentage and halo-length come out of the X_2 progenies that showed such high values.

The simple recessive nature of the 5 lock condition in *G. arboreum* has been confirmed and the gene is found to be independent in inheritance of several other known genes. This economically useful character cannot, however, be exploited straightway as several of the families pure for 5 lock condition show different degrees of fasciation, lateness and partial sterility.

A cross between Bishnoor and Malvi to study the inheritance of boll size shows that the large boll size is nearly dominant. The boll size, length and diameter, is closely related to leaf shape since the classification of the boll size in the F_2 according to leaf shape gives two groups one with the narrow leaf corresponding to the Bishnoor parent and the other with broad leaf corresponding to the Malvi parent.

While previous work had shown that the genetic red leaf in *G. hirsutum* is different from the red leaf caused by the attack of

Jassids, it has become clear that this is also different from the red leaf under investigation by the Cotton Physiologist and which is caused by either nitrogen deficiency or water logging in the soils. Transverse section of the leaf examined under the microscope shows that in the Jassid red and in the red due to nitrogen deficiency the pigment is mostly confined to the epidermal cells while in the genetic red such pigment is mainly to be found in the pallisade parenchyma cells. The expression of the genetic red is considerably influenced by environmental conditions such as time of sowing, fertility of the soil. It has now been possible to isolate types breeding pure either for the presence or for the absence of genetic red and suitable crossings will now be undertaken.

Progenies selected as Jassid susceptible and Jassid resistant on the basis of leaf crumpling were sown in four batches, 5th June, 16th June, 4th July and 7th July. Out of the 36 families studied, 6 were found resistant in all sowings and 14 susceptible in all the sowings. Among the rest some were free in the earlier sowings but got attacked in later sowings while others got attacked in the earlier sowings and became free in the later sowings. It is clear that to get a really Jassid resistant type sowings at different dates will have to be undertaken as otherwise we might be dealing only with Jassid escapes. A cross between a completely resistant and a completely susceptible type gave 102 free plants and 17 susceptibles when sown on 19th June and 93 free and 225 susceptibles when sown on 4th July. Observations on boll production over the 4 sowings in 2 families, one resistant and the other susceptible, show that the resistant family produces in the 1st sowing nearly three times the number of bolls produced by the susceptible family and the total boll production falls rapidly in both the families as the sowing is delayed and in the sowing on 7th July there is no boll production at all in the susceptible family.

(b) An apparently homozygous strain for wilt-resistance out of Dhar 43 was grown under controlled conditions inside the glass house which produced only 8 per cent mortality. An F_2 of a cross between Dhar 43 and Chinese red spotless grown in pots with plenty of wilt compost gave 29 per cent mortality due to wilt. But classifying the F_2s according to pigment, three groups are obtained, two like the two parents and one like the F_1 in the proportion of

1:2:1. Classifying the wilt mortality along with the three pigment groups, it is found there is no mortality at all in the group corresponding to the Chinese parent, 20 per cent mortality in the other parent and 46 per cent mortality in the heterozygous group. It is interesting to find that the whole complex of characters of the Chinese parent including its wilt resisting character go together in F_2. There also appears to be a time sequence for the invasion of the fungus according to the varieties. While the mortality is greatest in the early stages and gradually slows down in the later stages when plants are grown inside the glass house, one particular set of crosses where one of the *anomalum* derivatives figured as the parent, the mortality is low in the early stages and it suddenly shoots up after the seedlings are transplanted out of the glass house.

Breeding for wilt resistance has been taken a step further. In a small bulk trial of selected families of hybrid origin more than half a dozen are observed to have as low a wilt mortality under field conditions as V. 434 and Jarila, but definitely better than both Malvi 9 and Dhar 43 in yield, ginning percentage and halo-length. A further large-scale field-trial should decide the best of these to take the place of Malvi 9. When it is remembered that this hybridisation programme was started only in 1938-39, the progress made should be considered satisfactory.

(c) Four hundred F_3 progenies from randomly selected F_2 plants belonging to 16 crosses between 4 Bengals strains and 4 superior quality *arboreums* were grown in a replicated trial in 1943-44. The genetic fraction of the total variability in F_2 was estimated by the regression of F_2 progeny means on their F_2 parental values. The majority of these regression co-efficients are significant and range between 0.3 and 0.7. Though the F_2 variability does not differ appreciably among different crosses, the genetic variability does, and roughly follows the order of the regression co-efficients. The effectiveness of selection in a cross in raising the mean values of selected progenies above the average in the cross depends upon two factors, the initial average of the F_2 and the amount of genetic variabiltiy. For any given cross on the basis of normal distribution, the average excess of the selected genotypes over the cross average can be calculated for different levels of selection, viz., the highest 10% or 5% of the genotypes. Such a calculation made for halo-length

shows that the expected values of selected genotypes are mainly governed by the initial average of the F_2 from which they are selected. This means that in making selections attention should be concentrated on mean values. Since there is a high correlation between F_1 and F_2 it should be sufficient to grow F_1 s of crosses in replication in order to pick out those with the highest mean values and confine selection to these in later generations.

2. Interspecific hybridisation

This work is concentrated with two species *G. thurberii* and *G. raimondii*. Of the large number of plants from (*G. arboreum* × *G. thurberii*) doubled × *G. hirsutum*, several died in the early stages due to Jassid while some have given bolls and seed but the seed setting is still very low as in the original doubled hybrid between *arboreum* and *thurberii*. Selection for increased seed number per boll is being done. The triple hybrid has also been crossed reciprocally with the two parents using the triple hybrid as the female.

The original hybrid, *G. arboreum* × *G. thurberii* which was sterile due to defective anthers became fertile during the monsoon period giving bolls and seed reverting to sterility again during the winter and summer months, thus showing a seasonal rhythm in fertility. As the triple hybrid is quite susceptible to boll worm, work is in progress to see if the boll worm immunity of *G. thurberii* could be first transferred to Asiatic cottons and thence to the cultivated tetraploids. So far crossing between *G. thurberii* and *G. herbaceum* and between *arboreum* × *thurberii* undoubled hybrid and other *herbaceum* or *arboreum* types have proved a failure. One serious drawback against using *thurberii* as a female parent is the extreme susceptibility of the flower to injury.

The undoubled hybrid *G. hirsutum* × *G. raimondii* was backcrossed to *hirsutum* without any success. The doubled hybrid has given some bolls and seeds. While backcrossing the C_1 reciprocally to *hirsutum* did not give any bolls some of the C_2 plants produced bolls and these, unlike the C_1, cross successfully with *hirsutum* using the former as the female parent. The hybrids show the same nature of susceptibility to Jassid as the *raimondii* parent.

Since there was a very high incidence of wilt in the hybrid *G. arboreum* (K1) × *G. anomalum* doubled × *G. hirsutum* the cross

G. arboreum × *G. anomalum* has been repeated using the N. M. D. the 100% wilt resistant strain of Poona as the *arboreum* parent. The hybrid plants are now in the field for further work this season.

3. Physiology

While seed selected from a bulk sample for high density gives a large increase in yield over the unselected or the seed with a low density, such selected seed forms only a small fraction and is not of any practical utility. Large seed separated from small by mere sieving and where this fraction forms 1/3 to 1/2 of the bulk-sample does not, however, consistently give an yield increase and even where the increase is present it cannot be considered sufficient to recommend such separation as an agronomic practice. Some easier method of separating seed of high density has to be evolved.

An experiment with different placements of fertilisers, groundnut cake and ammonium sulphate showed that they all affect germination to a greater or less extent. The most unusual result of the year was the absence of response to manures in the case of the *desi* cotton. There was an indication that drilling is comparatively better than broadcasting in the case of groundnut cake whereas the reverse is the case with ammonium sulphate.

A small-scale field-trial with 4 varieties of cotton, 2 American and 2 *desi* and seed vernalised for different periods of cold treatment was conducted. It is found that only American seed shows the effect of vernalisation. There was evidence of the treatment inducing earliness in the American while the treatment appears to make the crop late in the *desi*. A large increase in yield of the order of 30-50 per cent over control is obtained in seeds subjected to cold treatment for 10-15 days in the case of one American variety.

Pure Jarila seed from three different sources, Indore, Akola, and Jalgaon was grown in a replicated experiment of the same design at the three centres. Seed source does produce large differences in various characters, the most definite of them being the increase in seed weight, lint length and reduction in ginning percentage and seed number per boll for the Indore seed as compared to the seed from the other two sources between which there are no large differences.

(4) Statistics

The use of the discriminant function as a means of selecting phenotypes on the basis of numerical scores assigned to individual plants was reported last year and the discriminant co-efficients of characters like boll number per plant, seed number per boll, weight of seed cotton per seed and ginning percentage for random progenies from local Malvi were reported. The discriminant coefficients obtained in still another experiment with different *arboreum* strains are now given. It is seen that the formulae are quite similar in the two cases except that a slightly higher relative weightage is given to the components, boll number and seed number in the case of *arboreum* strains. As before the coefficient for ginning percentage does not have any appreciable effect on the formula for yield of seed cotton. Its negative sign in both cases indicates that high ginning might be of slight disadvantage in selecting for high yield. The weight of seed cotton per seed has the highest coefficient and the coefficients for boll number per plant and seed number per boll though comparatively smaller have to be taken into consideration while selecting for high yield in *arboreum* strains.

The results of a uniformity trial with cotton have now been analysed to study the optimum size and shape of plots, the number and arrangement of plots in blocks and the most efficient layouts for replicated progeny row trials. Some of the main conclusions arising out of this analysis are (1) the standard error per plot does not increase appreciably by increasing the number of plots per block with a given plot size, (2) The standard error steadily decreased accompanied by an increase in block efficiency as plot size is increased, (3) Block efficiency is extremely low for all plot sizes when 120 or more plots are included in the block and (4) with a limited quantity of seed say 150 seeds to the plant it appears impossible to obtain a significant difference of 10 per cent between two progenies.

The analysis has also shown that the commonly adopted method of growing progeny rows in long continuous strips with controls at regular intervals is of no use and that an arrangement in compact block is definitely more efficient.

COTTON RESEARCH IN PROVINCES AND STATES.

BOMBAY.

(a) Broach Cotton Breeding Scheme.—The Cotton Breeding Scheme at Broach has been in operation since April 1932. The original object of this scheme was to obtain, by selection or hybridization, suitable types of cotton possessing wilt-resistant, high yielding, high ginning and superior spinning qualities, to replace the local mixture, a large proportion of which consisted of *Goghari*, a short staple, high ginning (40%) variety. In view, however, of the Committee's policy to replace, wherever possible, short staple with medium and long staple cottons, attention is now being concentrated on wilt-resistance, high yield and fibre length.

The breeding of wilt-resistant types originally formed part of the Broach Breeding Scheme, but as it was considered desirable that this work should be done under optimum conditions of wilt infection, and as the required conditions, especially soil temperature in pots, were difficult to maintain at Broach, this part of the work was transferred to Poona in June 1935, together with similar work on cottons for the Jalgaon tract.

The synthetic strain *Vijaya* (Segregates 1-2 and 1-6 evolved under the scheme is stated to be highly wilt-resistant besides possessing a ginning percentage of 41 against 33.7% of B.D.8 and 41.3% of Broach Local and a spinning value of 38s compared to 38-1/2s of B.D.8 and 13-1/2s of Broach Local. In respect of yield, it is reported to be on a par with B.D.8.

During the year under review, Segregates 1-2, 1-6, Vijaya, 3-50 and P.G.L. 7-29 derived from the back-cross (B.D.8×G.A.26)×B.D.8 were tested *in wilt-free soil* against B.D.8 and Broach Local. None of the strains was superior at 1% level to the local control which gave the highest yield, (559 lbs. per acre). 'Vijaya' yielded 550 lbs. per acre. The yield of the remaining strains, though significantly less than that of the local, was statistically better than that of B.D.8. All the strains combined high ginning character of the local with the long staple of B.D.8. *In wilt-infected soil*, the Segregates, along with B.D.8, recorded, as in the past, nil mortality against 13.2% of the local. In respect of yield, all the Segregates were on a par with

B.D.8; in comparison, however, with the local, the yields of 'Vijaya', 1-6, 3-50 and P.G.L.7-29 were significantly higher. The spinning test results of the last season (1943-44) show that the segregates are capable of spinning from 35s to 39s highest standard warp counts against 41s of B.D.8 and 11s of local. Three hundred hybrid selections, with the combination of 33-45 ginning percentage, 20-26 mm. staple and soft to silky feel, from the F_2 and F_3 generations of the straight and back-crosses of 1027 A.L.F. with 1-2, 1-6 and 5-18 were studied during the season. It is expected that about 150 plants with a ginning percentage of 38-42, staple of 21 to 23 mm. from some of the promising families, would be available for further study. In a comparison of the district and Farm growths of 'Vijaya', it was found that there was no deterioration in the district 'Vijaya' of stage A. Under the wilt breeding part of this scheme, the object of which is to evolve a cent per cent wilt-resistant type, from the material available at Broach, testing was confined to 33 progenies in pot culture at Poona, comprising 5 cultures each of Segs. 1-2 and 1-6 and 3 of Seg. 5-18. In all, 3,070 plants were under observation and 142 plants were selected for transplanting. It was observed that the Segs. 1-2 and 1-6 are not yet free from wilt, but the former showed a higher degree of resistance than the latter. Some of the progenies in both the cultures were completely free from wilt attack.

(b) Jalgaon Cotton Breeding Scheme.—This scheme has been in operation since April 1932. Its original object was to obtain, by selection or hybridisation, suitable wilt-resistant types with heavy yielding, high ginning and good spinning qualities to replace the local mixture of N.R. and *Banilla* cottons in Khandesh. Wilt-breeding work was originally included in the Broach and Jalgaon Cotton Breeding Schemes, but, in August 1936, it was decided that the wilt work should be treated as a separate scheme from the 1st April, 1937. In July 1941, the wilt-breeding scheme was extended up to 31st March, 1947.

During the year under report, seven cultures derived from Jarilla × N.R.5 cross were tested at the Government farms at Jalgaon, Dhulia and Mahadi. Of these, three cultures, viz., 197-3, 403-5 and 670-4 proved their superiority in yield, ginning and wilt-resistance over Jarila at all the three farms, for the fourth year in succession.

Under the wilt-breeding part of the scheme, three families of cross (Jarila × N.R.5) F_6 and a Dokras selection were tested in pot cultures at Poona. One of the families of the above cross and the Dokras selection were found to be promising as regards wilt-resistance.

(c) Scheme for breeding wilt-resistant cottons in Surat area.—This scheme was sanctioned by the Committee in August 1936 and commenced work in April 1937. The object of the scheme is to obtain a strain of cotton completely resistant to wilt and suited to the natural conditions obtaining in the Surat tract. This is sought to be achieved either by selection in 1027 A.L.F. or by crossing this cotton with B.D.8 or other wilt-resistant strains.

During the year under report, cultures from the following crosses were tested in the wilt-sick plot at Shera:—

(1) (8-1 × K.F.).
(2) (8-1 × B.C. 1-6)F_6.
(3) (1027 A.L.F. × B.C. 1-6)F_6.
(4) (Seg. 22-3-2-8 × B.C. 1-6)F_6.

A few cultures possessing the desirable combination of ginning percentage, staple length and high wilt-resistance have been obtained from cross No. 1 above. The material from the second cross has yielded the most promising results as some of the derivatives, besides being very highly resistant to wilt under field conditions, possess higher ginning percentage than 8-1 and approximate to 1027 A.L.F. in staple. Only one derivative from the third cross appeared promising. The cultures from the fourth cross have been found to combine all the desirable agricultural characters including spinning and they are being studied further with a view to isolating highly wilt-resistant types.

(d) Scheme for improvement of Wagad cotton at Viramgam and Jagudan.—While examining the possibility of growing medium and long staple cottons in the short staple areas of India, the Committee, in August 1935, decided that, in view of the absence of any serious attempt to improve the cotton of the large *Dholleras* tract, a comparative study of Indian and Iranian *herbaceum* cottons should be undertaken, with the object of finding out one or more suitable types for the tract. A special officer was deputed to Iran to collect

herbaceum types of cotton grown there and, in August 1936, a five-year scheme was sanctioned for the improvement of *Wagad* and *Mathio* cottons, the work on *Wagad* cottons being centred at Viramgam and that on *Mathio* at Amreli. The objects are the improvement of *Wagad* cottons for (a) quality and yield and (b) earliness in order to escape frost, and the replacement, if possible, of the inferior *Mathio* cotton of Kathiawar by early *herbaceum*. These are sought to be achieved by (a) selection in Wagad cotton, (b) hybridization with Surti-Broach quality cottons like 1027 A.L.F. and B.D.8 and (c) hybridization with Iranian *herbaceums* known to be early and of better quality.

The whole of the Wagad area is divided into two main tracts: (i) the Viramgam tract, characterised by low rainfall and (ii) the Dholka tract with greater and more regular rainfall. The main breeding station is situated at Viramgam and simultaneously a small immune area is being maintained under irrigation at Jagudan to safeguard the work at Viramgam. In July 1941, it was decided to establish another sub-station at Dholka for conducting botanical work on the promising material obtained from Viramgam.

During the year under review, 9 close boll types were tested against wagotar and local Wagad in replicated trials at Viramgam, Jagudan and Dholka. At Jagudan, the crop was seriously affected in patches by frost and the results obtained there are, therefore, not strictly comparable. It is stated that at Dholka, owing to the peculiar nature of the sub-soil, the crop prematurely withered and the yields obtained were very poor. The data revealed that no strain gave significantly better yield of *kapas* than the controls at any of the three centres. The lint yields, however, of the two types—K 61-8-2 and K.72-2- were slightly superior to that of Wagotar at Viramgam and Jagudan. In respect of ginning outturn, none of the types was equal to Wagotar at any centre, but all (excepting three strains at Jagudan) were either equal or superior to local Wagad at all the centres. All the strains (except one) were found to be better than Wagotar and local Wagad as regards mean fibre length at all the three centres and five of them have been adjudged suitable for spinning from 26s to 32s H.S.W.C. against 23s of Wagotar and 16s of the local Wagad. With a spinning value of 32s and consistently promising performance during the past two years,

K.72-2 is considered a particularly desirable type and it is proposed to test it along with two other strains in district trials in the ensuing year.

In a similar trial, six other close-boll types were tested for earliness. None was found to be early enough to escape frost. It is stated that further trials of early types will be dropped in accordance with the recommendations of the Agricultural Research Sub-Committee at its meeting in July 1944, and future work will be concentrated on the improvement of yield.

The progeny of three crosses, (1) (7-1×Seg.47A), (2) [1-6×(1027 × R.5) F_3 1] and (3) [7-1 × (7-1 P.210)F_1] was studied for the desired combination of characters. 93 plants were selected from the population of the first cross for further study. The material from the other two did not prove of avail.

(e) Scheme for improvement of cotton crop in Kaira District.— This scheme was sanctioned by the Committee in August 1939, subject to the condition that it would not come into operation until the Government of Bombay had declared Kaira district as a protected area under the Cotton Transport Act to prevent the import of inferior cotton from Nandurbar. In April 1941, the Government of Bombay issued a notification creating the Mahi-Sabarmati Zone (which includes the whole of the Kaira district) a protected area under the Cotton Transport Act, 1923; the scheme came into operation in September 1941.

Kaira district grows two kinds of cotton, (1) *G. herbaceum* var *frutescens*, popularly known as Kanmi and (2) *G. arboreum* var *typicum* known as *Rozi*, the former is an annual cotton of superior type and is generally grown in black soils, while the latter, which is found as a subordinate crop with cereals in *goradu* soils, is a perennial type, with short coarse staple and 25 to 26% ginning outturn. The area grown under these two cottons is, on an average, 78,000 acres, that under *Rozi* being 10,000 acres. Though the bulk of the cotton grown is the better *kanmi* quality, its reputation has, of late, been spoiled by the admixture of *Rozi* cotton in the gins. The object of the scheme is to find a superior type of cotton by selection or by introduction and trial of other perennial or annual cottons, to replace the *Rozi* type on the *goradu* soils of the Kaira district.

During the year under report, the second series of the rotational-varietal trial was laid out with the object of studying the economics and the possibility of replacing the perennial *Rozi* with the annual 'Vijaya'. The results of the first series in the previous season showed that the monetary return from the combination of Vijaya with *Kodra* was greater than that from *Rozi* with *Kodra*. These results were confirmed by the trials conducted in the season under review. In addition, it was found that the cash return from ratooned *Rozi* with Bajri was better than from Vijaya with Bajri. This is explained as being due to the fact that perennial *Rozi* grows better in the second season and escapes the shading effect of the cereal inter-crop, whereas Vijaya suffers under the shading effect of inter-crops, especially Bajri. The results of the experiment were, however, vitiated by the susceptibility of the ratooned *Rozi* to 'small leaf' disease and of Vijaya to root rot.

The testing of the exotic and indigenous perennial and annual varieties was repeated during the year, but as Nadam and Baluchistan 3 succumbed to the continuous rains experienced in the season, it is proposed, in the coming season, to study these types together with some more types from the different stations.

(f) Scheme for interspecific hybridisation in cottons at Surat.— This scheme was sanctioned by the Committee in January 1938, for a period of five years, with the object of obtaining, if possible, fully fertile hybrids between Asiatic and American cottons, combining the useful agronomic characters of both, particularly the good staple length of the American and hardiness and adaptability to Indian climate of the Asiatics. Work on crossing Asiatic and American cottons, begun at Surat in 1932, had already yielded 23 hybrids in which the American parents used were mostly the acclimatised Upland types from different parts of India, while the Asiatic parents were forms of *G. herbaceum* and *G. arboreum*. The hybrids produced from these were, however, sterile and efforts to induce fertility in them were successful only when they were back-crossed to American types. In January 1940, the Committee sanctioned in view of the rapid strides that the scheme had made an expansion of the scheme so as to include cytological studies during the remaining period of its continuance. In July 1943, the scheme was extended for a further period of five years from the 1st November, 1943.

During the year under review, 13 families derived from five back crosses, viz., B.C. Nos. 68, 117, 125, 134 and 170, were tested in replicated randomised blocks with 1027 A.L.F. and Co.2 as controls. The analysis of the yield data showed that only one culture, No. 6, gave significantly higher yield than 1027 A.L.F., while, six others—Nos.4, 7,8,11,12 and 13 were on a par with 1027 A.L.F. in this respect. Family 6 further combined higher ginning outturn and better staple than 1027 A.L.F. In comparison with Co.2, however, it was found that none of the cultures was significantly superior in yield, but ten families were as good. Of these ten cultures, six—Nos. 2,3,6,9,10 and 12—were superior to Co.2 in respect of ginning % and lint length and the remaining four proved to be better in staple length.

One hundred and seventeen plants from the F_3 of 9 fertile back-crosses and 54 plants from 5 F_4 cultures of the *inter-se* cross—(BC.68 $F_3 \times$ BC. 22 F_4)—were selected for study in the ensuing season. It is reported that with the object of producing new hybrids between the cultivated American and Asiatic cottons, 2232 flowers were crossed and eleven seeds combining the characteristics of *G. hirsutum* × *G. arboreum* were obtained.

The F_2 material derived from the synthetic tetraploids obtained by crossing the hexaploid 28-1 ($Co_2 \times$ 1027 ALF F_1 doubled) with the American wild cotton—*G. armourianum* and twice back crossed to cultivated American, was under observation, and 47 plants have been selected for further study in the coming season.

Reports of the preliminary trials of the interspecific material at various places in India, indicated that the performance of some of the types was encouraging under rainfed conditions at Gadag and Jalgaon and irrigated conditions at Coimbatore and Siruguppa.

(g) Scheme for improvement of Dharwar-American Cotton.— This scheme was sanctioned by the Committee in July 1941 for a period of five years, and commenced work in April 1942. The object of the scheme is to improve the Dharwar-American cotton crop grown in the Kannada districts of the Bombay Province, the adjoining areas of the Madras Province and in Hyderabad and Mysore States. This is sought to be achieved by the development, by selection or hybridisation, of an early maturing type, superior to Gadag 1 in respect of yield, staple length and ginning percentage, and which is, at the same time, more resistant to 'red-leaf' blight. The work is

being done at Gadag, where conditions of soil, climate, rainfall, etc., are suited to the cultivation of *hirsutum* cottons.

As in previous years, the two strains—9766 and 4411—were tested against Gadag 1 in a large-scale replicated trial; the results showed that these strains are significantly superior to the control in respect of yield; they also have better ginning percentage and longer staple than the control. In respect of spinning capacity, they are slightly inferior to Gadag 1, being adjudged suitable for 28s warp counts against 32s of G. 1. This is, however, attributed to the adverse effect of an inclement season. During the year, ten promising families derived from the cross (Gadag 1 × Co.2) were tried against G. 1 in replicated progeny rows. Families 9-3 and 9-10 were found to record consistently the highest yields. With a ginning percentage of 37, staple length of 24.4 mm. and a high degree of resistance to red leaf blight, family 9-3 is distinctly superior to G. 1 which is only partially resistant to red leaf, has a staple of 21 mm. and gins 33.8%. In addition, 9-3 is said to mature earlier than Gadag 1. The trials will be repeated in the coming season. Nine improved exotic types, obtained from various places, were once again tested against G. 1, 9766 and 4411, for yield and other economic characters. Unlike last year, M.4 was found to be equal to G. 1 and 9766 in respect of yield, though, inferior to both of them in ginning outturn. The rest of the varieties also are stated to be superior to G. 1 in one respect or another. L.S.S. once again proved to be the earliest to mature.

(h) Scheme for investigation of 'small leaf' disease of cotton.— This scheme is an off-shoot of the Mungari Cotton Breeding Scheme. It was sanctioned by the Committee in January 1942, for a period of three years and came into operation on the 1st June, 1943. The object of the scheme is to investigate the causes of "small leaf" disease of cotton, and to determine whether or not the disease is of virus origin. The work is being carried out at Poona. A survey of the disease was undertaken during the year in some cotton growing areas in the Bombay Province and the Central Provinces and Berar. It has now been confirmed that 'small leaf' disease can be successfully transmitted by grafting. Transmission of the disease by sap or by insect vectors has not so far been successful. A study of the pathological histology of the diseased plants is under way.

SIND

(a) Scheme for production of long staple cottons in Sind.— Ever since the opening of the Lloyd Barrage, the question of the establishment of a compact block of long staple cottons in Sind has engaged the attention of the Indian Central Cotton Committee. Although attempts in the introduction of long staple quality cottons in Sind in the past have not met with the success it was anticipated they would, the project, nevertheless, is considered to have possibilities which are well worth investigating. Accordingly, a five-year scheme for cotton-breeding investigations for the production of long staple cottons has been launched. The scheme came into operation in April 1940. In July 1944, the Committee sanctioned an extension of the scheme for a period of five years from the 19th April, 1945. The experimental stations are situated at Mirpurkhas and Oderolal. The most important problem to be tackled is to see whether high quality cottons, preferably of the American types, but possessing a better staple than Sind Sudhar, can be produced. The aim is to evolve a cotton longer than 1-1/16" which would spin about 60 counts and give a high acre cash value of *kapas* relative to the commercial cotton crops now being grown in Sind. This is sought to be achieved by selecting extra long staple Upland types from a wide range of places all over the world, and, after testing them under Sind conditions, hybridising the best of them with the hardiest Upland types of cotton, such as Sind Sudhar and M.4, now grown on a commercial scale in Sind.

During the year under review, a good number of single plants combining the desirable characters from a large F_2 population of the hybrid material raised in 1942-43 season was selected and their progenies of the F_3 generation tested under replicated trials during the 1943-44 season. Progenies which in addition to maintaining the same yield and ginning outturn as the Sind-American control strains (Sind Sudhar and M.4) possessed an extra staple length of 1/8 inch and more, were carried forward to the F_4 generation in 1944-45, in replicated tests. Out of a large number of such F_4 progenies the following strains hold out great promise. These strains have been introduced into replicated varietal test in 1945-46 season.

Parentage.	Strain No.	Yield in oz. per plot.	Yield in mds. per acre (calculated)	Staple m.m.	Ginning percentage.
(M4 × Wilds) M4	45/2	25	18.4	28	32
Wilds × S. S.	7b/4	24	17.7	28	33
M4 control		26	19.2	24	33
S. S. control		22	16.2	23	32
D. T. Webber × M4 ..	41/4	32	23.6	29	32
Wilds × M4	32/4	31	22.9	28	32
do.	33*a*/2	30	22.1	28	32
do.	33*b*/5	30	22.1	28	32
M4 control		39	28.7	23	31
S. S. control		20	14.8	23	29"

(b) Scheme for Cotton Jassid Investigation.—In Sind, jassid attack is most prevalent in the south-east Tharparkar district where it is proposed to establish a compact block of long staple cotton. One of the harmful effects of this pest is improper development of the seed, so that, in certain seasons, good seed is not available for sowing purposes, and this gives a setback to the extension of improved varieties. Accordingly, in August 1937, the Committee sanctioned the above scheme, for a period of three years and six months, with the object of studying the habits of jassids, their alternative hosts and the manner in which certain varieties of cotton resist jassid attack. In January 1941, the scheme was extended up to 18th April 1945. In July 1943, however, the Committee decided that the scheme in its present form should be wound up forthwith, as it was considered that there was very little prospect of any results of practical value emerging from it. The scheme accordingly terminated on the 29th August, 1943. The progress made during the period under review is described below:—

It is reported that observations on the relative infestation of jassids on 6 varieties of cotton, viz., Sind Sudhar, M.4, L.S.S. S.L.D.1, Co.4, K.25, tested in the varietal trial, showed that jassid population was lowest in M.4 and S.L.D.1, whilst K.25 and Sind-

Sudhar harboured the largest numbers; L.S.S. and Co.4 occupied an intermediate position. The seasonal sowings in April, May and June with M.4 and Sind-Sudhar indicated that late sowing in June encouraged jassid attack and gave poorer yield than either the April or May sown crops. The study of the influence of cultural practices, such as, manuring, watering, spacing, and drilling *versus* broadcasting, on the density of jassid population has not yielded results of any value. In the experiment designed to study the correlation between jassid abundance and hairiness, it was observed that, except in the case of 4F-98 and N.T.38, there was a tendency for the more hairy types to be more resistant to jassids.

(c) Scheme for Co-ordination of Research on Black-headed Cricket in Sind and Baluchistan.—The scheme for investigation into the black-headed cricket in Sind was sanctioned by the Committee in January 1938, for a period of three years, with the object of establishing the identity of the pest and studying its life history, seasonal behaviour and the extent of the damage caused by it. Before the opening of the Lloyd Barrage, the black-headed Cricket had been known as an occasional pest of *Sorghum* and cotton in Upper Sind and some parts of the Punjab. With the introduction of cotton cultivation on the Right Bank of the Indus, however, this insect has become a serious pest of cotton in the seedling stage in Khirtar and Johi tracts in Sind and in some parts of Baluchistan. The pest appears in the cotton fields towards the end of April and disappears in June. The period of its activity synchronises with the sowing time of cottons and causes almost wholesale destruction of the crop. The pest appears to belong to the same species as met with in Baluchistan, viz., *Gryllulus domesticus.* Since April 1941, the scheme has been merged in the scheme for co-ordination of research on black-headed Cricket in Sind and Baluchistan. The combined scheme was sanctioned for a period of three years from the 1st April, 1941. In January 1944, an extension of the scheme was sanctioned for a further period of one year. The scheme terminated on the 31st March, 1945.

The objects of the co-ordinated scheme were (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent

literature on anti-locust measures and (3) to control and prevent the ravages of the pest by means of poison baits. The Baluchistan part of the above scheme has been dealt with elsewhere.

The studies undertaken have revealed that the black-headed cricket *Gryllulus domesticus*, Linn, feeds on cotton seed as is sown in the field, the young seedlings and the harvested grain of rape seed and wheat from the threshing yards during April, May, and June in Upper Sind and adjoining parts of Baluchistan. It breeds extensively during March and April in the soil of fields with s anding *rabi* crops of wheat and rape seed and then becomes a pest. Hot and dry climate favours its mass multiplication and by the middle of June, the pest declines, when the humidity in the air increases. The cracking of clayey soil in the infected area offers a good breeding ground to the pest. In a non-pest farm, it keeps on breeding throughout the year. The life cycle of an adult has been found to vary from 22 to 44 days in the case of a female and from 20 to 33 days in the case of a male. The Cricket has no fixed number of generations in a year, but, under laboratory conditions, it has been observed to pass three to four generations. The intensity of pest infestation is found in the months of April, May and June and by mid-June there is a decline in the pest. A shower of rain in early June proves destructive to the pest, in the absence of rain, however, the insect continues in a mild form during June and early July. The pest is nocturnal in habit.

Attention was directed towards its control by chemical (poison bait) methods and seed treatment and agricultural measures. The proportion of the ingredients of the bait, which proved successful is as follows:—

(1) Sodium fluosilicate (poison)	1 part
(2) Molasses (attractant)	1 part
(3) Rice or wheat bran (career)	20 parts
(4) Water	12 1/2 parts.

Among the careers tested, rice bran was found to be the best, chopped juar standing second. For marking an efficacious poison bait, experiments showed that the bran ought to contain more of powdery flour and less of coarse husk or broken rice. Soaked cotton seed sown in the fields proved to be the best attractant than any other material.

In view of the futility of the poison bait in the presence of growing cotton seedlings, the destruction of the pest was undertaken before the commencement of the sowing season. Fruit juices and amyl acetate make the bait more attractive, the latter, however, appears to act as a repellant. Orange and lime juices appear to increase attraction; common salt acts as a better attractant than molasses and on a field scale the former was found preferable to the latter on account of its portability. So far as the agricultural measures of control are concerned, ridge *versus* broadcasting of cotton gave evidence to the effect that the former was more expensive than the latter and the latter method though practised generally could not offer means of control. Observations on the effect of early and late sowing showed that the early sown cotton which has reached the two leaf stage escaped the damage from the pest. Sowings from mid-April to mid-June were observed to be liable to damage. Results of sowing 4F-98, Sind-Sudhar and M.4 showed that the early sown gave the best results. In late sown, the plants remained dwarf, but the method of control has only a limited application in view of the inability of the former to complete all sowings. Early and late sowings to be successful require heavy manuring and close spacing. To bring the poison bait method to fruition, large scale baiting over fallow land and co-operative effort by all zamindars is essential.

(d) Scheme for bollworm investigation and clean-up campaign in Sind.—This scheme was sanctioned by the Committee in January 1940, for a period of 3-1/2 years, and it came into operation on the 1st September, 1940. The work proposed to be carried out under the scheme during the first seven months was (a) to survey the host plants during the off-season of cotton and (b) to test the efficacy of the implements evolved elsewhere. During the remaining period, it is proposed to carry out a clean-up campaign and to study its effect on succeeding year's crop. The investigations are confined to the Tharparkar district.

In July 1943, the scheme was extended for a period of three years, with effect from 1st March, 1944. During the extension it is proposed (1) to survey all the cotton growing tracts of Sind to study the status, distribution and the various host plants of the pest, and to determine the time suitable for carrying out control measures,

(2) to carry out control measures in a compact area of 1200 square miles in the rice tract of Tharparkar district and to extend them to the Hyderabad district during 1946-47.

It is reported that the incidence of Pink boll-worm which was practically negligible throughout the cotton area till the last season, assumed serious proportions in most of the talukas of Hyderabad and Tharparkar, during October-November 1944. This is attributed to the mild and humid climate of the two districts and to the heavy summer rains during the year. The attack of pink boll-worm in other districts remained very low.

The clean-up operations were carried out on an area of 1200 square miles, comprising 180 *dehs* mostly confined to the rice tract where the spotted boll-worm attack was very serious. It is stated that the commencement of the operations was delayed till January as owing to scarcity of labour the pickings were postponed, but through vigorous efforts the cleaning-up was completed by the middle of March.

PUNJAB

(a) Punjab Botanical Scheme.—This is one of the earliest schemes of the Committee. Sanctioned in 1923 for a period of five years, it came into operation in August 1925, and has been extended from time to time, the last extension, which will expire on the 28th February, 1945, being approved by the Committee at its meeting held in January 1940. Until 31st March, 1936, the entire cost of the scheme was borne by the Committee, but since then, the expenditure is shared on a 50 : 50 basis between the Committee and the Provincial Government. The original object of the scheme was to investigate the causes of the periodic failures of American cotton in the Canal Colonies of the Punjab where a large area is annually grown under such cottons, and to obtain suitable types of American and *desi* cottons. In view, however, of the immediate economic importance of improved types of cotton, work was concentrated on breeding, and a separate physiological scheme was sanctioned for investigating the problem of periodic failures of American cotton. The Botanical scheme has thus been concerned mainly with the improvement of both *desi* and American cottons. As more than half the cotton area in the Punjab lies in the Canal Colonies, attention

was first directed to the improvement of the cottons of that area. The South-Western tract of the Province, comprising the arid districts of Multan, Muzaffargarh and Dera Ghazi Khan, were given attention next and a sub-station for this purpose was opened at Multan in 1935.

The scheme terminated on the 28th February, 1945, and was replaced by four new schemes, viz., (1) Scheme for improvement of cotton in Jhang district, (2) Scheme for improvement of cotton of south-eastern districts of the Punjab, (3) Scheme for improvement of cotton in Lower Bari Doab Colony and (4) Scheme for improvement of cotton in south-western tract.

During the year under review, the total area under cotton in the British districts was 2,457,600 acres, of which 1,753,600 acres were under Punjab-American and 704,000 acres under *desi*. medium and long staple American varieties constituted 71.3% of the total Punjab cotton crop. Large-scale tests with re-selections from 289F/43 and L.S.S. conducted during the year under review indicated that selection 238F, besides retaining the good qualities of its parent 289F/43 possesses 3% higher ginning outturn and superior technological properties. Three selections from L.S.S., viz., 265F, 318F and 320F, appear to satisfy the aim underlying the investigation of production of an early maturing form of L.S.S. to escape frost. All the three are reported to have longer staple than their parent L.S.S.

The breeding of jassid-resistant American varieties was carried out by crossing the Punjab-American varieties with the Cambodia strains from Madras, viz., 920, Co.3 and Co.4. The crosses with the latter two types are still in their early stages, and those obtained with 920 have yielded progenies which have shown complete immunity to the pest. The work on the improvement of *desi* cottons by crossing Jubilee with the Wild Nigerian cotton, *G. anomalum*, a set of five new strains possessing lint strength greater than even Punjab-American L.S.S. have been obtained. Their yield is nearly equal to that of Mollisoni and their ginning outturn varies from 36 to 38%. It is claimed that these new strains will, in due course, completely revolutionise the *desi* cotton industry of the province. The work at the Multan sub-station has resulted in the evolution of three improved strains, one *desi*, 119 Sanguinuim and two American,

124F and 199F. The *desi* strain is being distributed since 1940 in the three south-western districts. Strain 124F has been approved for distribution in the south-western tract. It has already spread on its own merit over an area of about one lakh acres. 199F, which is under test for the last four years, has combined good yield with high ginning outturn, 35-36% and lint length of a full 1". The technological properties of this strain have already attracted the attention of some leading ginners of the Punjab and due to the high premium that was offered for its *kapas* during the season, a very keen demand for its seed is said to have been created. It is expected that the area under this strain will run into a few thousand acres during the next cotton season.

At the Jhang sub-station, which has been concentrating work since 1941 and the production of American cottons, three new strains, viz., 244F, 268F and A.C.71, superior to 4F in yield, staple length, ginning outturn and technological properties, are reported to have been evolved.

The sub-station at Hansi was originally started with the object of improving the *desi* cottons of the south-eastern Punjab, but as the conditions created by the war necessitated curtailment of area under short stapled cottons, the work was switched on to breeding suitable American varieties for this region. Amongst the *desi* strains evolved so far, 231 Rosea and 258 Mollisoni appear promising and both have given significantly higher yield than the present strain, Mollisoni 60A2. Amongst the American strains selected. 216F, by virtue of its extreme earliness and yielding capacity equal to that of Mollisoni, holds out promise of successful cultivation in the tract and the prospects of converting a predominantly *desi* tract into an American cotton tract seem to be bright.

(b) Scheme for improvement of Punjab-American 289F/K.25 Cotton.—This scheme was sanctioned in January 1938, for a period of five years and commenced work from the 9th July, 1938. The object of the scheme is the improvement of 289F/K.25 cotton which was evolved at the B.C.G.A. Farm some years ago. Though this strain is very popular in the Lower Bari Doab Canal Colony and the area under it has expanded very rapidly, it suffers from the defect of susceptibility to jassid attack. One of the aims of the

present scheme, therefore, is to develop jassid-resistant strains from this cotton.

It is reported that the season under review proved to be one of the worst for the cotton crop in the Punjab; owing to the early onset of the monsoon and excessive precipitation throughout the growing period, jassid infestation was very severe. In addition, towards the commencement of the picking season, *tirak* also made its appearance; these two factors together, it is stated, depressed the yields to a level never experienced before. The average yield of 289F/K.25 on the B.C.G.A. farm during the year was only 4.65 mds. per acre, against 8.5 mds. in 1943-44 and 16.17 mds. in 1942-43.

Three selections from 289F/K.25, viz., 279F, 280F and 282F, and three derivatives of the cross between 289F/K.25 and 289F/43, viz., A.C.83, A.C.84 and A.C.85, were tested against 289F/K.25 for the second time in a replicated trial. The results revealed that A.C.84 and A.C.85 are superior to the control both as regards yield of *kapas* and ginning outturn. They further combine desirable technological properties with marked jassid resistance and are said to be comparatively more remunerative to the grower. All the available seed of these strains was placed at the disposal of the B.C.G.A. for large scale trial in the coming year. In another trial with 12 new selections—eight of which are re-selections from 289F/K.25 and four derived from the back cross 289F/K.25 (289F/K.25 × 289F/43)—it was found that, with the exception of two, the rest outyielded the control significantly. Apart from high yield, several of these strains possess 2 to 3% higher ginning outturn, appreciably longer lint and high jassid resistance. It is stated that very varied and promising material is now on hand at Khanewal and further sifting is expected to yield strains far superior to the commercial 289F/K.25.

(c) Physiological Scheme.—Arising out of the work done in the Punjab under this scheme and in view of the desirability of investigating the applicability of the results achieved under it to other areas, the Committee, at its meeting in January 1944, sanctioned a new scheme for Cotton Physiological Research with headquarters at Indore. Under this scheme, it is proposed to commence work in three cotton tracts, viz., (1) irrigated (2) partially irrigated and partially rainfed and (3) totally rainfed. The province of Sind will receive special attention as the problems to be tackled there are

almost similar to those in the Punjab, though the climatic and soil conditions are different. The aim will be to find out the fundamental facts and then attempt to apply the knowledge gained into practice for improving the quality and quantity of cotton in general.

The object of the scheme is to obtain, as far as possible, precise knowledge of the inter-relationship between the soil and climatic factors and the growth of different varieties of cotton and to endeavour to utilise the knowledge thus gained for improving the quality and yield of cottons in general.

During the year under review, further experimental evidence has been produced to show that the yellowing-reddening in Sind-American cottons was caused by nitrogen deficiency and that the yellowing-reddening was associated with a low nitrogen content. When the cotton plants on light sandy soils were manured with the sulphate of ammonia, the leaves remained green in colour and their nitrogen concentration was also much higher than that of the leaves of the control plants which had turned yellow and red. Similarly the nitrogen content of the leaves of the late sown crop was higher than that of the leaves of the early sown plants. The former remained quite green while the latter turned yellow-red at the fruiting stage. Closely spaced plants turned yellow-red much earlier than the widely spaced plants sown on the same date and this difference between the two was similarly associated with their nitrogen contents. The leaves of M4 plants retained their green colour for a longer period than the leaves of either the L.S.S. or Sind-Sudhar grown side by side on the same date. It was found on chemical analysis that the nitrogen concentration of the leaves of M4 was much higher than the nitrogen concentration of the leaves of the other two varieties at the corresponding stages of growth. The greater concentration of nitrogen in the leaves of M4 was found to be associated with the lesser leaf matter produced by this variety. The total dry weight of the leaves per plant of M4 was nearly half of the total dry weight of the leaves per plant of the other varieties. The manuring of cottons in Sind where yellowing-reddening occurs has been found to give substantial increases in yield. The mean response to manuring with 3 maunds of the sulphate of ammonia in a common experiment conducted at three centres in Sind was 4 maunds per acre.

80% of the red leaf trouble in Sind cottons was of the yellow-red type and if it could be remedied by the application of the fertilizer, the cotton growers will be greatly profited. As there was another type of reddening where the change was from green to red and where the application of the fertilizer was found to be of no benefit, it would be difficult for a zamindar to apply the remedy at the right place. A practical method for giving guidance to zamindars is now being worked out.

It has been demonstrated for the second year in succession that *tirak* in Sind-American cottons can be ameliorated by adopting later sowings. It is also shown that by adopting close spacing for later sowings this measure of late sowings for remedying *tirak* can be adopted with advantage. In majority of experiments late sowings with close spacing have given higher yields than the normal sowings.

The experiments so far conducted have shown that the optimum sowing periods of cottons can be shifted forwards with great advantage if close spacing is adopted. The extent to which cotton sowings can be delayed in Sind is found to vary in different tracts. As 1944-45 proved to be an abnormal season, it was considered necessary to repeat the experiments for another season for finally adjusting the optimum sowing periods for cottons in different parts of Sind.

The investigations conducted in Sind have revealed some very important physiological characters of the Sind-American variety of M4. They are (1) Earliest of all varieties; (2) Very low sympodial; (3) Lowest leaf dry matter; (4) More resistant to yellowing-reddening than other varieties; (5) Higher boll weight; (6) Higher yielder and (7) More responsive to late sowing than other varieties.

A study of the effect of spacing in the presence and the absence of manuring on the growth and the yields of cotton in the black cotton soils of Gujarat has disclosed some important features. A closely spaced crop gave nearly the same yield as a widely spaced crop in the absence of manuring while when the manure in the form of groundnut cake was applied there was a progressive increase in yield as the crop was spaced wider and wider and the highest yield of 5.7 maunds per acre was obtained when the crop was spaced

the widest, i.e., at one plant per 16 sq. ft. It was thus found more profitable to manure a widely spaced crop than a closely spaced crop. The increase in yield due to manuring for a closely spaced crop was small and unprofitable.

A study of the growth and yields of cotton under different spacings revealed that even though the yields of closely and widely spaced plant in the absence of manuring were equal, the efficiency of the crop, i.e., weight of *kapas* produced per 100 grams of the whole plant increased as the spacing became wider. Thus the operation of some factor other than nitrogen is suspected when the crop is widely spaced. This factor by itself in the absence of manuring is not able to produce any increase in yield but when manuring is done it probably comes into operation. The yields therefore progressively increase as the spacing becomes wider when the crop is manured and the increase in yield is expected to be partly caused by nitrogen and partly by the other factor unknown at present. The investigation is being followed up.

The application of the groundnut cake has been found in the same experiment to make the crop definitely early under Gujarat conditions while the reverse was the case in the Punjab. Similarly the closely spaced crop matured earlier than the widely spaced crop.

No difference in the response on yields of composted and uncomposted oil cakes has been found in the Punjab conditions. This is however the finding of one year trial only.

(d) Cotton Jassid Investigation in the Punjab.—This scheme is concerned with the study of the Jassid insect in the Punjab, as regards its habits, alternative host plants and characters of the cotton plant which determine resistance to the pest. The scheme terminated on the 31st March 1945.

It is reported that the observations on the relative importance of the three species of jassid—*E. minor*, *E. Kerri* var *motti* and *E. devastans*—have shown that *devastans* is the only species which infests cotton seriously in the Punjab. As regards the comparative incidence of the pest on different commercial strains of the Punjab-American cottons, 289F/K.25 and "Victory" have been found to be susceptible, while 199F, 4F, 289F/43, and L.S.S. have proved to be

resistant to the pest. The work on the nature of resistance has shown that jassid females do not oviposit freely on resistant varieties but that if the eggs are laid in the leaf veins of even the most highly resistant types, there is no difficulty in their hatching and the nymphs reaching maturity. Of the different characters of the leaf veins studied, hairiness has been found to be the most important; plants possessing 95 or more hairs per centimeter length of the leaf vein have been usually found to be resistant. As regards the age of leaf in relation to jassid oviposition, the jassids prefer 35 to 46 days old leaves for egg-laying and avoid very old and very young leaves for this purpose. Observations made on the effect of the several agronomic factors and seasonal conditions on the incidence of infestation and population of jassids have shown that the intensity of jassid attack is positively correlated with high rainfall and high relative humidity and that jassid population is influenced by date of sowing, spacing and frequency of irrigation; late sowing, wide spacing and frequent irrigations have been found to be conducive to increase in jassid numbers.

The scheme has shown that the evolution of resistant strains is the only means of controlling the pest. In this connection, it is claimed that the close association of leaf hairiness with resistance has simplified the task of obtaining resistant varieties.

CENTRAL PROVINCES AND BERAR.

Central Provinces and Berar Cotton Breeding Scheme.—The Central Provinces and Berar Cotton Breeding Scheme was sanctioned by the Committee for a period of five years with effect from the 1st April, 1939, and replaced the Central Provinces Botanical Scheme which terminated on the 31st March, 1939. The object of this scheme is to evolve, by selection or hybridisation, suitable new strains of cotton which can compete successfully with the local *Oomras* in point of ginning outturn and yield and which, at the same time, possess a staple capable of spinning between 20s and 25s highest standard warp counts. The scheme is worked at Nagpur and at Akola, to suit the special requirements of the Central Provinces and Berar, respectively.

The Central Provinces Cotton Breeding Scheme is concerned with the breeding of improved strains of cotton suitable for Nagpur,

Wardha, Chanda and parts of Chhindwara districts and capable of replacing the ordinary short staple mixed cotton of these areas. The scheme at Akola is concerned with the production of high-yielding superior strains of cotton suitable for the Berars and possessing a staple of at least ¾", with the softness, colour and strength of V. 434 and a ginning percentage above 33. Breeding of high ginning new strains of *Buri* cotton for the Burhanpur *tahsil* also forms part of this scheme.

During the year under review, V. 434 was cultivated over an area of 3,99,156 acres in the Central Provinces and Berar against 5,32,564 acres in the preceding year. The area under Jarila was 1,379,847 acres, compared with 1,348,304 acres in 1943-44; Buri occupied some 1,11,543 acres in different parts of the province, of which 94,000 acres were in the Nimar district. As in the past, yield trials were carried out with the promising strains and the results showed that strain No. 091 and M. 5A are the best; the former gave significantly the highest yield of all the strains, including local Jadi, tested in the experiment. Jarila is stated to have continued to be promising in respect of yield as well as other economic characters. Strain No. 091 is reported to have a staple of 21 mm. and a ginning percentage of 37.5, while M. 5A, it is stated, possesses a fine staple length of 31/32", capable of spinning up to 40s highest standard warp counts. It is, therefore, considered to be distinctly superior to V. 434 and Jarila.

Field tests of H. 420 against Verum 434, Jarila and local Jadi were carried out in representative localities of the Central Provinces. Owing, however, to unfavourable weather conditions, particularly in the early part of the season, several of the trials were spoiled. In the Nagpur-Wardha tract, H. 420 maintained its high level of yield over V. 434 and Jarila. This is confirmed also by large-scale trials on the cultivators' fields. H. 420, which covered some 5,000 acres in the Nimar district, is reported to have withstood heavy and late rains better than V. 434 and Jarila.

New selections were made in Buri with the object of isolating a high ginning strain to replace the existing type, Buri 107, which is a low ginner. These selections will be tested in the coming season. In the varietal trials, four improved strains of Buri were compared

with Buri 103, Buri 107 and Local Buri. The results were statistically significant and two strains, 0396 and 0394, gave higher yields than Buri 103 and 107 but were on a par with the local bulk Buri. Another strain 0382 was also found to be superior to Buri 107; the three strains will be tested again in the coming year. On the Akola Farm, Buri 107 was grown on an area of over 27 acres and gave an average yield of 343 lbs. per acre against 711 lbs. in the previous year.

MADRAS

(a) Scheme for Improvement of Mungari Cotton in Madras Province.—This scheme was sanctioned by the Committee in 1937 and has for its object the evolution of strains suitable to the red soils and combining the quality of the Westerns with the yield of Mungari, to replace the inferior Mungari, the existence of which affords opportunities for mixing, with the result that the better cottons of the tract fail to get their proper value. On the black soils of Anantapur, Bellary and Kurnool districts of the Madras Province, cottons commercially known as Westerns and Northerns are grown. These are medium staple varieties, capable of spinning 24s to 32s. The type of cotton grown on the red and mixed soils, on the other hand, is that known by the name of Mungari, which is a coarse, short staple variety, similar to Bengals, and not fit to spin more than 8s or 10s. The coexistence of these widely different varieties in the same tract favours undesirable mixing, with the result that the better cottons suffer in value. It is to overcome this difficulty that the Mungari scheme was started.

During the year under review, the sowings were done in proper season but the prolonged drought that followed them affected both the growth and yield of the Mungari cotton in general. The yield tests arranged at Adoni and on the cultivators' lands consisted of nine and seven varieties, respectively. Of these, six were common to all centres of trial. Jarila, Umri bani, V. 434 and H. 1 failed at Adoni but were on a par with local in most of other trials in the districts. Strain 1595 was late for a Mungari variety. Strain 881 F was the most consistent and cosmopolitan of all the variants. It is reported to be a warp variety with a staple of 0.95 inch and a yarn strength of 100 lb. for 19s. X7682 was the only American variety

which equalled the local in the Mungari trials at Adoni in both types of soil.

There were seventeen families and two hundred and sixty-four hybrid progenies under yield tests during the year. The progeny row tests had to be resown with the reserve material as the germination, stand and growth were poor. Thirteen families were found to be either better than or equal to local in yield and earliness. Of these only two, viz., 2093 F1 and 2643 C contained residual variability for further reselection. Four families, viz., 2069 A1, 2069 A5 2093 F1 and 2093 F6 representing reselections for early habit from 6145 were among the promising group awaiting bigger yield tests. They have been uniformly consistent in yield and fibre characters in both compact family block and small bulk tests. The yields of progeny row tests were not statistically analysed on account of poor yields. Forty fresh second generation crosses and twenty new first generation hybrids with early varieties were raised. Fifty-nine F. 2 derivatives mostly from K. 1 x *anomalum*, K. 1 x *Rozi*, K. 1 x Burma C. 19 and K. 1 x *Changfeng* were found on examination to satisfy the staple and ginning standards of the tract.

Three varieties proved to be resistant to stenosis over three seasons. The best and earliest of them, viz., G. 4, M. 11 will be used as a parent in hybridisation with prolific, early, medium staple, susceptible types.

The red hairy caterpillar evinced a distinct preference to cucumber seedling but they were so gregarious that unless a thick intercrop was raised, the insect always moved on to cotton when the whole of cucumber was eaten.

(b) Scheme for Improvement of Cocanadas cotton in Madras Province.—This scheme was sanctioned by the Committee in November 1938, for a period of five years. The work was started from 1st February, 1940. The object of the scheme is to improve the yield and ginning percentage of Cocanadas cotton, preserving at the same time the light pinkish colour of its lint owing to which it is in great demand for the manufacture of dyed yarns.

As the Cocanadas cotton is cultivated on both black and red soils, arrangements were made to sow the seed material at two places, viz., at Narasaraopet to represent the red soils and at the Agricultural Research Station, Guntur, for black soils.

Colour improvement being one of the objectives of the scheme, greater attention was paid to investigate the limits of variation in the different standard lint colour grades. Seeds of plants representing five standard grades were sown in six agricultural research stations. When the *kapas* of each plant was analysed, it was observed that grades 2 and 3 were not different from one another. Grades 4 and 5 were likewise similar. All the above four grades showed dilution in colour, the dilution being greater at Coimbatore than at other places. It was further noticed that the colour was not influenced by the time of sowing and that wide variations were present in the colour of the lint produced on the same plant even after removing the effect of exposure. Studies of the effect of exposure showed that all grades except No. 1 deepened in colour within certain limits peculiar to each grade. It was clear from the observations that the standard grades needed regrouping based on the ranges of variation in each, and that the upper limit of improvement of lint colour in Cocanadas cotton by the method of single plant selection could only be grade 3. Further intensification in colour is possible only by crossing it with imported varieties. It is stated that amongst the Asiatic cottons the highest grade of lint recorded so far was 5, while in the Americans the depth reached grade 7. Arrangements were made to cross the standard strain in the Cocanadas variety, viz., X20 with higher grades up to 5. Besides, a Cambodia strain having lint of grade 1 was crossed with cotton of grade 6 and 7 with the object of evolving a type of American cotton suited to the red soils of the tract. The studies also indicated that it would be necessary to determine whether the lint colour standards used by the trade were the result of genetic or environmental factors. Such a clarification would be necessary since, in case the former set of factors was found responsible for deeper colour it will not be possible to combine lint length and colour owing to the negative correlation existing between them.

During the year under review the seasonal conditions at Narasaraopet were such as to bring about a marked dilution in lint colour.

Ten progenies at Narasaraopet and six at Gurzala yielded more than their respective controls. Nine others at Gurzala were equal to X20. Among these, 1395 C1 and 1395 C2 combined productivity, colour, staple and ginning. Polur 6 appeared to be an improvement over X20 in all respects except colour. One of the hybrid derivatives

of G. 1037, viz., X2220 though segregating for colour possessed high means for staple and ginning. In bigger trials families 123 and 129 proved suitable for the July-August sowing which would represent the major season in the Cocanada tract. The same trend was noticed in smaller bulk tests conducted with the sibs of the three coloured families, viz., 123, 129 and 130. Of these, 129 would appear to be the best judged from staple, ginning, fibre weight and spinning performance.

The variability for staple and ginning was very limited in the several village bulks of *chinnapathi* cotton and early Hyderabad strains. Evolution of a coloured early type would need hybridisation and two second generation crosses, viz., C. 6-3 × Cutchica and C. 7 × Mahaling Burma, were under study during the year.

The trends of association between deep colour and high fibre weight noticed in the preliminary experiment at Coimbatore were not borne out in the tests communicated by the Technological Laboratory, Bombay. Fineness as judged by the standards of fibre weight was closely associated with high dye absorption but this property bore no relation to the ultimate tint. The performance of X20 and 129 in yield and dye absorption tests as well as in staple and fibre weight determinations compared well with the unselected Gurzala local. Further they recorded a high tintometer reading than local in the matter of basic lint colour. The spinning properties too, were in favour of these two. Some of the mills which were consulted, appreciated X20 but not 129. An ideal biotype would be an improved X20 with the colour of 129.

UNITED PROVINCES

The United Provinces Botanical Scheme.—This scheme was sanctioned by the Committee in 1938. The object of the scheme was (1) to develop improved strains of Bengals cottons, for the rain-fed and irrigated tracts of the United Provinces, from the material collected in the course of the survey of cottons in Rohilkhand and Bundelkhand, (2) to test the suitability of the United Provinces improved cottons—C.402, C.520 and Perso-American—against local and other promising introductions, both on Government farms and cultivators' fields and (3) to investigate the possibilities of American

cottons under the United Provinces conditions. The scheme terminated on 31st March, 1944.

The scheme was operated at four centres, viz., Cawnpore, Raya, Nagina and Belatal, representing the Central, Western, Rohilkhand and Bundelkhand cotton tracts, respectively. It is stated that detailed examination, purification and replicated tests of the material derived from the 27,000 single plants selections made in the different cotton areas and from the strains, C.520 and C.402. has yielded 8 strains, viz., C.520/2, D, A, 34/4, 35/1, 35/3, 35/6 and 36/5b which are superior to C.520 in respect of yield, ginning outturn, spinning value and acre cash return. In addition, a few wilt-resistant strains have been isolated; these combine better yield with longer lint and greater resistance than C.520, but require to be further tested before they can be given out.

The outstanding result of the scheme is the isolation of Perso-American cotton, which is now under distribution. Field trials carried out on Government Farms during the past four years have shown that this variety may fetch as much as Rs. 5/- and Rs. 18/8 more per acre than C.520 and local *desi*, respectively. Perso-American is now grown over an area of 22,000 acres and about 1,022 bales of it were sold in 1943-44 at a premium of Rs. 80/- to Rs. 100/- per candy over Jarila. Several strains of American cotton imported from the Punjab, Parbhani and Sind are being tested against it and C.520, under local conditions. In these trials, L.S.S. and 100F have outyielded Perso-American for 3 years. Both these cottons are said to be promising as regards spinning value which ranges from 31 to 38s in the case of L.S.S. and 41 to 47s in the case of 100F, against 32s of Perso-American.

The Provincial Government have now taken over the work of the United Provinces Botanical Scheme and trials with all the promising strains are being continued by the Agricultural Department.

BENGAL

Scheme for cultivation of long staple cotton in Bengal.—The object of this scheme was to test the possibilities of introducing long staple cottons in the well-drained highland soils of Bengal. It is financed jointly on a 50 : 50 basis, by the Provincial Government and

the Bengal Millowners' Association and it came into operation in April 1938. In January 1941, the Indian Central Cotton Committee agreed to provide a supervising officer for the scheme for a period of two years. In addition to supervising cotton cultivation work at the different centres, the officer will also undertake botanical work. In January 1943, the scheme was extended for a period of three years, but it was closed down on the 30th September 1945, as it did not give indication of any useful results emerging out of it.

The work carried out under the scheme has indicated that the highland areas of the districts of Midnapore, Bankura, Nadia, Jessore, Murshidabad and Rangpur of West Bengal, are suitable for cultivation of long staple cottons, whilst East and North Bengal, which are low lying and receive a high rainfall, are not. Of the different varieties of cottons tried, Parbhani-American, Co.3 and Co.4 are said to have appeared promising even under adverse seasonal conditions. The cultivators of Bengal are reported to be taking increasing interest in cotton growing.

BALUCHISTAN

Scheme for co-ordination of research on Black-headed Cricket in Sind and Baluchistan.—The scheme for the control of Black-headed Cricket in Baluchistan was originally sanctioned in August 1939, for a period of two years, to run concurrently and in co-ordination with the scheme for investigation into the Black-headed Cricket in Sind sanctioned by the Committee in January 1938. The combined scheme for co-ordination of work in progress in Sind and Baluchistan was sanctioned in January 1941, for a period of three years from the 1st April, 1941. In January 1944, the scheme was extended for a further period of one year from the 1st April, 1944. The objects of the scheme were: (1) to study the life cycle and seasonal behaviour of the pest with special reference to the breeding places in both the provinces, (2) to investigate suitable control measures, special attention being paid to the recent literature on anti-locust measures, and (3) to control and prevent the pest by means of poison-baits. The scheme terminated on the 31st March 1945.

The study in Baluchistan of the life history and seasonal behaviour of the cricket is stated to have shown that the insect passes through one generation only during the course of a year; the eggs

are laid in cracks of dry and barren soil in September and the nymphs hatch out by the end of March; they become adults by about the end of June and are rarely seen in winter.

The cotton crop in the Usta tahsil is attacked by the regular migration of the *tid* from the Kachhi district of Kalat State through the seven bridges spanning the Khirtar Canal which separates the two areas. Control work in Baluchistan consisted of the following:—

(1) Checking and destroying the insects at the Khirtar Canal bridges, and

(2) Controlling the pest in the tahsil itself.

The control measures were carried out every year from April to July or until the strip of land known as 'pat' along the Khirtar Canal was flooded. These measures consisted in placing baits and barriers in the way of the migrating pest. The 'pat' side of each canal bridge was blocked by digging trenches and keeping them filled with water with a layer of kerosene oil floating over it. The undermentioned bait was found effective against the pest:—

Sodium fluosilicate	—	1 Seer
Rice bran	—	20 Seers
Molasses	—	1 Seer

with enough water to make it crumbly.

The control work was co-ordinated and conducted on identical lines in Sind and Baluchistan.

HYDERABAD STATE

(a) Gaorani cotton improvement scheme.—This scheme, which is an off-shoot of the Hyderabad Botanical Scheme was sanctioned by the Committee in July 1943, for a period of 5 years from the 1st April, 1944.

The objects of the scheme are:—(1) production of suitable, fine quality, wilt-resistant strains of *bani* cotton for the three different zones, viz., North-East, Central and South-West portions of the Gaorani protected area and (2) evolution of a suitable upland strain for the highlands of Adilabad. Work in connection with the production of wilt-resistant types of Gaorani is being conducted at Parbhani, as part of the newly sanctioned scheme for the improvement of Oomras cotton. During the year under review, G.6 covered

some 3,61,121 acres in Nanded district. Two other improved strains —G.12F-2 and G.6E-3—are also being multiplied up in Latur taluq and Wadi Buzrug in Nanded taluq, respectively. As in previous years, three or four improved Gaorani strains were tested against G.6 and the Local in varietal trials at Nanded, Madhol and Latur. None of the strains proved to be better than the controls in respect of yield at Nanded and Madhol. At Latur, however, 990A outyielded the local significantly. It is hoped to select from the material on hand a strain of cotton superior to Gaorani 6 in ginning outturn, spinning performance and wilt-resistance. The experiments at Latur indicate that G.12F-2 is likely to solve the immediate needs of that zone. Further work at the Latur centre is proposed to be concentrated on the isolation of a high ginning type from G.12F-2 and an early maturing selection form G.4M-11.

Of the one hundred and ninety-five single plant selections of upland cotton tested against the local American bulk at Adilabad, ten promising progenies were retained for further study. District trials were conducted with three or four improved varieties of cotton at 18 centres in the Gaorani Protected area and three places on the Adilabad plateau. The trials at six places in the Gaorani tract failed totally and those at the remaining centres gave no conclusive results. Manurial trials were laid out at Nanded, Latur and Madhol with the object of testing the efficiency of groundnut cake as a source of Nitrogen for improving the yield of cotton. Groundnut cake and Ammonium sulphate were the two forms of Nitrogen applied at 20, 40 and 60 lbs. per acre. The results revealed that the differences in yield of *kapas* due to the two sources of Nitrogen were not significant at Nanded and Latur; at Madhol, however, the plots that received Ammonium sulphate gave significantly higher yield than those manured with groundnut cake, confirming the results obtained in the previous year at this station. The effect of different Nitrogen doses at all the three centres was significant. At Madhol and Latur, it was observed that, with increasing doses of Nitrogen progressively, increasing yields were obtained. In another manurial experiment laid out on the farmers' fields at Deglur, Ahmadpur and Hingoli, where groundnut cake alone was applied in two doses at 20 and 40 lbs. of Nitrogen per acre, it was found that 20 lbs. of Nitrogen in the form of groundnut cake was

a suitable dose for cotton grown under monsoon conditions in black soil tracts.

(b) Scheme for improvement of cotton of Oomras tract in Hyderabad State.—This scheme was sanctioned by the Committee in August 1940, for a period of five years, and it came into operation on the 8th October, 1941. The object of the scheme is to improve the cotton of the Oomras tract of the State. This is sought to be achieved

(1) by the production of an early maturing and high ginning strain of Gaorani 12F, for the eastern half of Parbhani District and Hadgaon taluka of Nanded district,
(2) by the production of an early maturing and high ginning strain of Parbhani-American, for the *Ghat* area of Aurangabad District,
(3) by evolving a wilt-resistant strain from G. 16C, by crossing it with New Million Dollar, for the western half of Parbhani District and part of Bhir District,
(4) by breeding a high ginning, quick maturing, wilt and drought-resistant variety capable of spinning 12-16s highest standard warp counts, for the southern half of Aurangabad District.

As in the previous season, the work in connection with the production of wilt-resistant types of Gaorani was carried out at the Cotton Research Station, Parbhani, in conjunction with the above scheme.

During the year under report, some 721 selections were tested in the preliminary wilt experiment in single rows in wilt-infected plots using Gaorani 6, as the control. Six progenies, three of which are selections from Hyderabad Gaorani, one from Gaorani 12F-2 and two from Gaorani 167, recorded nil mortality against 38·77 per cent of the control. Two of the selections—II-42-7199 and II-44-933—recorded nil mortality in the previous season also. The mortality of ten selections ranged from 1 to 5 per cent and that of 19 selections from 6 to 10 per cent.

The varietal test was conducted at three sites with three improved strains, viz., II 41-6919, Indicum 17, Gaorani 12F-2 against Jarila and the local. Strain II-41-6719 (a sib of Gaorani 160) was

very promising in respect of yield and ginning percentage. Gaorani 12F-2, an early maturing strain, with yield as good as Parbhani local or Jarila, maintained its superiority in respect of spinning performance over both these varieties. It is stated that if some of the higher ginning sub-strains of this culture maintained their ginning character from season to season and proved to be as good as the parent in other economic characters, the problem of improving the cotton of the Oomras tract would be nearer solution. In another trial, five improved strains of Hyderabad Gaorani were tested against Parbhani local, Gaorani 12F-2 and Jarila. The results indicated that the yields of strains Gaorani 12F-2 and II-41-6919 were better than those of Parbhani local or Jarila.

Of the six early maturing American strains tested, two strains —II-43-8348 and II-43-8380 (a segregate from Parbhani-American 1 x Co.2, backcrossed to Parbhani-American 1) gave significantly higher yields than Parbhani-American 1. Both are reported to be earlier maturing than Parbhani-American 1, with a ginning percentage of 33.4 and 35.4 and a mean fibre length of 1.04" and 0.99" against 29.2 per cent ginning and 0.94" fibre length of Parbhani-American 1, respectively.

In the District trials conducted at nine centres in Parbhani, Bhir and Aurangabad districts, with three or four improved strains, it is reported that the yield of Gaorani 12F-2 was the highest at all centres except one in the Parbhani district. Strain II-41-7040 is reported to have given significantly higher yield than the local at two centres at which it was tried. Indicum 17 excelled the local at five centres, but the difference in yield was significant at two centres only.

Parbhani-American is reported to have given significantly higher yield than the remaining American strains at Silod on heavy soil. On light soil at the same centre, all the *arboreum* strains gave significantly higher yield than the American strain included in the trial.

(c) Scheme for improvement of Kumpta cotton.—This scheme was sanctioned for a period of five years and it came into operation in November 1937. The object of the scheme is to develop certain strains of Kumpta cotton bred from the local variety of Raichur

which, in the preliminary tests conducted at the Government Experimental Farm, Raichur, prior to the starting of the scheme, had given better yields of both seed-cotton and lint than either the local variety or improved Jayawant. After two years' work, the strain Raichur-Kumpta 15 was selected for further development. It was sown in 1939-40 on an area of about 40 acres in a cultivator's field, and an average yield of 293 lbs. of seed cotton per acre was obtained. Though this yield was a good deal better than the average of the local variety in the adjoining fields, the Committee, at its meeting held in August 1940, suggested that this strain should not be distributed on account of its susceptibility to wilt, and that strain R.K. 19 should be tested instead and attempts made at once to produce a wilt-resistant Kumpta type.

During the year under review, three Raichur-Kumpta strains, viz., R.K. 19, R.K. 25 and R.II-38-673, a new Kumpta selection, were tested against Hagari and the local. The new strain (R-II-38-673), which significantly outyielded all other types last year, failed to keep up its previous level of yield of seed cotton. Besides, its lint was found to be coarse and of low spinning quality. On the other hand the performance of R.K. 19 in respect of yield of *kapas* and quality of lint was consistently uniform. Of the 17 single plant progenies tested in another replicated trial six were retained for further study. Of these, the most important is R-II-43-2472, a sib of R.K. 19, which combines a white creamy and silky lint with other desirable characters.

As in the past, the wilt test was conducted at Hunsihalhuda and 25 resistant, high yielding progenies were selected for testing in the ensuing season. District trials were conducted at seven centres, of which those at two centres were failures and those at four other centres did not reveal any significant differences in yield between the varieties tested. At the seventh centre, viz., Kopbal, Jayawant, significantly outyielded the R.K. strains and Hagari.

At Poona progenies of three families of the back-cross (R.K. 19 × N.S. 12) × R.K. 19 were tested in pot culture, and only one family was found promising as regards wilt-resistance.

Material of a number of new Kumpta strains received for pot culture tests, proved highly susceptible to wilt.

BARODA STATE

(a) Scheme for improvement of Mathio cotton at Amreli.—This scheme has for its object the improvement of Mathio mixture in respect of yield, ginning percentage and quality and the trial at Amreli of the early strains of Wagad evolved at Viramgam with a view to replacing, if possible, inferior Mathio by early *herbaceums*. The scheme came into operation in June 1937.

During the year under review, large-scale varietal trials were conducted with two types—S.24-2 and S.31 at five centres in Kathiawar, viz., Amreli, Ingorala, Damnagar, Palitana and Jamnagar using C. 520 and Mathio as controls. The yield data showed that S. 31 was on a par with the controls at four out of the five centres, while S. 24-2 equalled the checks at all the five localities. Both of them, however, were superior to the local Mathio in respect of ginning outturn, fibre properties and spinning capacity. S. 24-2 was adjudged suitable for spinning 19s and S.31 for 30s, H.S.W.C. against 13s and 14s of Mathio and C.520, respectively. It is stated that S.31 is an outstanding selection which is likely to alter entirely the general level of Mathio cotton if widely extended. The Department of Agriculture, Baroda, therefore, proposes to recommend a large-scale extension scheme to cover the whole of the general Mathio area of Kathiawar, after obtaining in 1945-46 further confirmatory evidence as to its superior performance.

Fourteen families, one selected from Mathio and 13 derived from the F_4 progenies of two crosses—S_5 x Jarila and S_6 x Jarila were tested against C. 520 in replicated trials. Eight families which appeared promising have been retained for further study.

MYSORE STATE

Scheme for breeding Sea Island and Egyptian cottons in Mysore.—This scheme, which is an off-shoot of the Mysore (Doddahathi) cotton scheme, was sanctioned by the Committee in January, 1944, for a period of three years from 1st November, 1944.

It is concerned with (1) the acclimatisation and breeding of Egyptian and Sea Island cottons and (2) the testing, in large-scale trials, of Mysore-American strains evolved under the Doddahathi scheme.

During the year under review, two new homozygous Mysore-American strains—M.A.X. and M.A.XI—were tested on the Irwin

Canal farm in a seasonal-varietal test along with Co. 4 and other Mysore-American strains, M.A.V, VI, VII and IX. The results showed that M.A.V. was the best, having recorded significantly better yield than all other M.A. types; M.A.X was equal to Co. 4 in the February sowing. In a similar experiment at the Babbur farm, M.A.VI proved to be the best yielding type, thus confirming the previous observation about its being the most suitable strain for the tract. In the district trials, M.A.V. is reported to have done very well compared to Co. 4 or the local. It gave, on an average, an outturn of 600 lbs. of *kapas* per acre, both under irrigated and rain-fed conditions, against the average of 500 lbs. in the case of Co. 4. The demand for its seed was great and arrangements have been made to distribute sufficient seed to cover 500-700 acres during the coming season.

In the trials of Egyptian varieties on the Irwin Canal farm, Giza 12 gave significantly better yield in all the three plantings done in November, December and January; Giza 7 was the next best, while Maarad and Ashmouni gave very low yields. On the Babbur farm seasonal sowings were done in May, June and July, but owing to heavy rains in July, the germination was poor and the trial had to be abandoned. In other trials, however, G.7 is said to have given the highest yield.

The testing of Sea Island was done side by side with Egyptian types and the results, during the year are said to have confirmed the previous conclusion that October-February sowings are conducive to better growth of this cotton as compared with the Egyptian cottons.

A replicated randomised manurial experiment was conducted with Giza 12 using 3 levels of nitrogen (0, 50 and 100 lbs. per acre), 3 levels of phosphoric acid (0, 25 and 50 lbs. per acre) and 3 levels of Potash (0, 25 and 50 lbs. per acre). The analysis of the data revealed that the effect of nitrogen alone was significant and that the highest yield was obtained from the treatment of 100 lbs. of nitrogen in combination with 25 lbs. of P_2O_5 per acre. A slightly modified trial with S.I.V. 135 and Giza 12 using six levels of nitrogen (0, 50, 75, 100, 125 and 150 lbs. N per acre) with a basic treatment of 25 lbs. P_2O_5, 25 lbs. of K_2O, and sann hemp at 2,000 lbs. per acre is now in progress.

CHAPTER V.

EXTENSION WORK IN THE PROVINCES AND STATES

From the point of view of the grower, special significance attaches to the Seed Distribution and Extension Schemes of the Committee, as they form the real link between the Experiment Station and the cultivator. The total amount so far spent by the Committee on such schemes amounts to some Rs. 17½ lakhs. During the period under review, there were twenty seed distribution and extension schemes in operation in the various cotton growing provinces and States; a brief report on the working of these schemes is given below:—

BOMBAY

(a) Surat Seed Distribution Scheme.—This scheme was first sanctioned in November 1929 for a period of two years. In December 1931, it was extended for another two years, pending the final decision of the Committee on the cotton policy to be adopted in the Surat area. In January 1934, after a thorough examination of the relative merits of 1A and 1027 A.L.F., the Committee decided in favour of the later and extended the scheme for five years for the distribution of 1027 A.L.F. seed in the Surat area. In November 1938, the scheme was extended for a further period of one year. In August 1939, for three years, and again in July 1942, for a period of two years from the 1st April, 1943. The scheme terminated on the 31st March, 1945.

During the fifteen years of operation of the scheme, the area under 1027 A.L.F. fluctuated widely from year to year, depending on the response of the Co-operative Cotton Sale Societies and the demand of the market. The largest area covered by this variety was 1,93,498 acres in 1934-35, out of a total area of 2,80,713 acres under cotton in that year. Owing to its low ginning out-turn and unremunerative premia realised in the comparison with Selection 1A, 1027 A.L.F. did not find favour with the cultivators and gin-owners. It was, therefore, decided to replace it by the newly evolved type "Suyog" a derivative from the cross between 1027 A.L.F. and 1A, which combines the high ginning of the latter with the lint qualities of the former.

(b) Scheme for selection 1A Cotton.—This scheme was sanctioned in November 1938, for a period of three years, subject to the condition that it should come into operation only if and after the Government of Bombay had isolated Olpad and part of Chorasi Talukas, and that it should continue only so long as this area was effectively isolated. On the fulfilment of this condition, the scheme came into operation in February 1940. In July 1942, it was extended for a further period of two years and two months. The objects of the scheme are (1) to confine the growth of 1A, as far as possible, to Olpad Taluka, by restricting the movement of cotton and cotton seed out of that area and by making provision for pure seed of Selection 1A for cultivation within the Taluka area, and (2) to check the cultivation of 1A in the rest of the Surat area by arranging for the distribution of adequate quantities of pure seed of 1027 A.L.F. and by intensive propaganda against Selection 1A. The scheme terminated on 31st March, 1945.

To prevent illicit import of cotton by road from Olpad to the Surat and Ankaleswar areas, check stations were maintained on the Tapti and Kim rivers. During the past two years, however, check stations were maintained on the Tapti alone. Half pressed bales from Olpad area were allowed to be transported under licence to Surat for being pressed and marked "Olpad" before sale.

With the introduction of the improved strain "Suyog", which combines the good qualities of both 1A and 1027 A.L.F., the question of the comparative merits of the two varieties, 1A and 1027 A.L.F., has ceased to be a problem and the Co-operative Cotton Sale Societies in the Olpad area have gone in for the seed of the new strain for sowing in the coming season. In view of the changed situation, the Bombay Government were requested, at the instance of the Local Sub-Committee, to withdraw the Notification segregating the Olpad taluka and part of Chorasi taluka north of the Tapti from the remaining portion of the Surat district, on the ground that with the introduction of the improved strain "Suyog", the need for such segregation has ceased to exist.

Action has been taken accordingly by the Provincial Government.

(c) Jarila Seed Distribution and Extension Scheme.—This scheme was sanctioned in March 1937, for a period of ten months in the first instance. It was extended in January 1938, for a period of one year, in November 1938, for three years and again in July 1941, for a further period of five years. Its original object was to replace Banilla in the Khandesh tract with *Jarila*, which is wilt resistant, over an area of some 1,55,000 acres. In view, however, of the general suitability of *Jarila* for the Khandesh area, the expansion now aimed at is 8,00,000 acres, out of a total cotton area of 11,00,000.

The scheme is operated in five stages of which the first two are the Government Farms at Jalgaon and Bhadgaon. The seed produced at the Jalgaon Farm is used for further multiplication in the wilt affected regions, and that at Bhadgaon Farm for the wilt free zone of Khandesh. In January 1943, the Committee approved of the proposal to close down the seed farm at Bhadgaon and to transfer the seed multiplication work being done there to the Jalgaon Farm and the Mamurabad village adjoining it.

Stages I and II.—The selfed seed from the previous year was sown on an area of 20.20 acres on the farm and gave 3,130 lbs. of seed for multiplication in Stage II. Out of 100 acres of cultivators' land at Mamurabad (near Jalgaon farm), an area of 9 acres and 5 *gunthas* had to be ploughed up owing to adverse seasonal conditions. The seed of Stage II produced from the remaining area was 13,264 lbs. All the cotton under the two stages was ginned in the farm gin and the lint sold by auction at Jalgaon; it fetched Rs. 234/- per boja, i.e., Rs. 518/- per candy F.O.R. Bombay, against Bombay Jarila quotation of Rs. 457/- per candy on that day.

Stages III and IV.—Of the 65,78,260 lbs. of Jarila seed distributed by the Department and approved stockists, only 47,70,090 lbs. of seed were reported to have been utilised for sowings. The controlled area during the year was 2,31,362 acres (including a reserved area of 64,005 acres). This falls short of the stipulated area of 4,50,000 acres by 2,18,638 acres; the reduction is attributed to (a) the lateness of the season, (b) the Grow More Food Campaign and to (c) a stock of about 16,74,140 lbs. of seed remaining unsold. The total area under Jarila cotton (including natural spread) is estimated at 3,44,267 acres against 8,38,548 acres last year.

The growers realised on an average a premium of Rs. 17/- per maund of kapas. The auctions organised by the Co-operative Societies during the year were successful. A total quantity of 1141 bojas of purified Jarila lint was sold at a premium varying from Rs. 4/- to Rs. 60/- over the prevailing Bombay Jarila quotations. The gross extra income realised by the cultivators of Jarila is estimated at Rs. 49,05,805/-.

For sowing in 1945-46, the Agricultural Department and approved stockists have stocked 64,81,800 lbs. of seed sufficient to cover 3,49,000 acres.

The Bombay Government have applied the Cotton Control Act to the whole of East Khandash District and to West Khandesh excluding Nawapur Peta, Nandurbar, Taloda talukas and to the talukas of Nandgaon, Malegaon, Baglan, Kalwan and Yeola of Nasik District, from the 1st November, 1944, Jarila being the prescribed variety for these tracts. Mixing of and trade in any variety other than Jarila has also been prohibited. Arrangements are also stated to be under consideration for the application of the Cotton Transport Act to the Khandesh tract, the restriction being confined to imports by rail only as imports by road are not very large.

(d) Deccan Canals (Jarila) Seed Distribution Scheme.—This scheme was sanctioned in January 1934, for a period of five years and came into operation in April 1934. In August 1939, a further extension for five years was sanctioned. At the same time the venue of seed multiplication was also changed from Kopergaon and organised on new lines in Baramati tract.

The original object of the scheme was to distribute seed of Banilla to enhance general cotton yields and to improve the quality of the cotton in the Deccan Canals tract in the Poona, Sholapur and Ahmednagar districts. In view, however, of the susceptibility of Banilla to the wilt disease, the Committee at its meeting held in January 1942 approved of the proposal to replace Banilla by Jarila which gives a bigger return per acre and is, at the same time, capable of resisting wilt to a great extent.

During the year under report, the scheme was kept in abeyance as irrigation under Deccan Canals was being regulated with a view

to encouraging the cultivation of food crops and to discourage the growing of cotton.

(e) Revised Jayawant and Gadag No. 1 Seed Distribution Scheme.—This scheme, which was sanctioned in August 1935, for a period of five years, replaced five seed schemes in the Southern Division of the Bombay Province, viz., the Hubli, Gadag, Athani, Haveri and Bailhongal schemes. It came into operation on the 1st June, 1936; in August 1940, it was extended for a period of one year and again in July 1941, for a further period of four years from 1st June, 1942.

The orginal object of the scheme was to eliminate local mixtures and to extend pure *Jayawant* and Gadag No. 1 in the Southern Division of the Bombay Province, over an area of 9½ lakhs acres, within a period of five years. During the extension period of the scheme, it is proposed—

(1) to cover an additional area of 425,000 acres with *Jayawant* and 75,000 acres with Gadag No. 1;
(2) to carry on intensive propaganda for the cultivation of improved cottons and to check the growing of inferior types;
(3) to have *Jayawant* and Gadag No. 1 pressed under departmental supervision and marketed under 'Agmark';
(4) to make seed distribution work self-supporting by gradually reducing the subsidy on cotton distributed, until, by the 31st May, 1944, it is eliminated; and
(5) to entrust the work of the scheme to efficient co-operative organisations, provided the working of the scheme is not adversely affected.

The scheme is operated from eleven centres for *Jayawant*, viz., Dharwar, Hubli, Nargund, Haveri, Bailhongal, Gokak, Athani, Bagalkot, Hungund, Bijapur and Muddebihal, and from two centres for Gadag No. 1, viz., Gadag and Ron. Decentralisation is the keynote of the scheme, the idea being that no single agency should have too big an area to cover or too great a responsibility to shoulder.

During the year under report, the Department organised an area of 1,11,852 acres of Jayawant and 19,600 acres of Gadag No. 1, of which 89,785 acres and 18,084 acres respectively were rogued. 29,845 bags of Jayawant seed and 6,800 bags of Gadag No. 1 seed

were distributed to cover an area of 4,17,830 acres and 68,000 acres respectively. The area under natural spread is estimated at 2,00,000 acres and 50,000 acres under Jayawant and Gadag No. 1, respectively, thus bringing the total area under Jayawant to 6,17,830 acres and that under Gadag No. 1 to 1,18,000 acres, the corresponding figures in the previous year being 6,53,200 and 1,53,600. The reduction in acreage in the year under report is attributed to the application of the Bombay Growth of Food Crops Act, absence of timely rain and fall in the price of cotton.

44,970 docras of Jayawant and 10,929 docras of Gadag No. 1 were sold by auction at a premium of Rs. 15/- per bag of 1344 lbs. for Jayawant and Rs. 20/- for Gadag No. 1 over the *bazar* rates.

It was originally programmed to stock 1,01,50,000 lbs. of seed of Jayawant and 20,00,000 lbs. of seed of Gadag No. 1 for sowing in the next season; the purchases up to the 30th April, 1945, amounted to 28,00,000 lbs. and 8,00,000 lbs. respectively. Owing, however, to the reduction of cotton area in Karnatak under the Bombay Growth of Food Crops Act, it is now not proposed to stock the full quantity of seed programmed for.

Agmarking was continued on an optional basis. Up to the end of April, 1945, the number of bales agmarked were 4,292 of Jayawant and 203 of Gadag No. 1. It is stated that unless the millowners appreciate the value of Agmarking and are prepared to pay adequate prices for Agmarked bales, the Agmarking of cotton would not become popular.

(f) Scheme for cultivation of 1027 A.L.F. Cotton in Nawapur Taluka.—This scheme was sanctioned by the Committee in January 1942, for a period of three years and it came into operation on the 4th May, 1942. In January 1945, it was extended for a period of one year.

The original object of the scheme was to cover an area of 25,000 acres in Nawapur taluka with 1027 A.L.F. cotton. During the extension period, it is proposed to multiply 1027 A.L.F. cotton in the controlled area so as eventually to cover the whole area with it.

During the year under report, 105,552 lbs. of seed of 1027 A.L.F. were distributed over an area of 4,302 acres (against 3,320 acres programmed for), including a certified area of 3,790 acres. The

produce was pooled and marketed by public auction at Rs. 5/- to Rs. 10/- per *bhar* (924 lbs.) of seed cotton, over local. It is stated that the growers of 1027 A.L.F. realised a gross extra income of Rs. 55,625/- (at Rs. 5-9-0 more per acre over the local).

(g) Scheme for multiplication and distribution of "Vijaya" cotton in Middle Gujerat.—This scheme was sanctioned by the Committee in July 1943, for a period of five years and it came into operation on the 1st December, 1943.

The object of the scheme is to completely replace local Broach and B.D. 8 cottons by Vijaya cotton over an area of 5 lakhs acres in the Nerbudda-Mahi and the Mahi-Sabarmati zones of middle Gujerat.

During the year under review, the Agricultural Department controlled a seed multiplication area of 11,051 acres (including 259 acres grown with farm pedigree seed), against an area of 15.257 acres (including 571 acres grown with farm pedigree seed) in the previous year. The total estimated area under 'Vijaya' cotton during the year was 89,450 acres against 1,10,000 acres in 1943-44, the reduction being attributable chiefly to the application of the Bombay Growth of Food Crops Act. Out of a total quantity of 7,34,530 lbs. of 'Vijaya' seed handled this year (against 13,28,376 lbs. in the previous year), 2,54,570 lbs. were distributed by the Agricultural Department and the balance, viz., 4,79,960 lbs., by the co-operative societies, to cotton growers in Ahmedabad, Kaira and Broach districts. It is stated that the usual rate of multiplication of the area under 'Vijaya' cotton in the tract is 15 times. Of the 3,247 bales obtained from the controlled area, 2,943 were sold at a premium varying from Rs. 41/- to Rs. 80/- per candy F.O.R. Bombay, over May Indian Cotton Contract quotation.

It is stated that the premia obtained by the improved types, like B.D. 8 and 1027 A.L.F., were not sufficient to compensate for the loss due to their low ginning outturn and consequently 'Vijaya' cotton, which is a better ginner than the two varieties mentioned, was purchased by the ginowners at a premium of Rs. 15/- to Rs. 20/- per *bhar* of 1020 lbs. of seed cotton.

(h) Scheme for multiplication and distribution of "Wagotar" cotton in Ahmedabad district.—This scheme was sanctioned by the

Committee in July 1943, for a period of three years and 4 months. It came into operation on the 1st December, 1943.

The object of the scheme is to organise the multiplication of Wagotar cotton seed so as to extend this cotton over an area of 2 lakhs acres in the Wagad tract of the Ahmedabad district comprising the talukas of Viramgam, Sanand, Dholka and Dhanduka, where at present local Wagad mixture and Wagad 8 are grown.

During the year under review, a total quantity of 104,000 lbs. of Wagotar seed was available for distribution. Of this, 29,010 lbs. were purchased by the Department, 43,000 lbs. were distributed directly by the approved agents and the remaining quantity was sold by merchants to the farmers. The seed handled by the Department was sufficient to cover about 3600 acres. Owing, however, to unfavourable seasonal conditions, the area controlled was only 560 acres against 6,000 acres originally programmed. Stages II and III were organised at Jakhawada and Haripura in Viramgam taluka over 1-30 and 67-23 acres, respectively. The produce of these two stages is being purchased and ginned under Departmental supervision.

The *Kalas* (dry bolls with seed cotton) of stages IV and V were purchased by the approved agents at Dholka, Dhandhuka and Viramgam (at Mandel only) talukas at a premium of three to four annas per maund of 40 lbs. over the prevailing market rates.

The gross extra income derived by the growers of Wagotar during the year is estimated at Rs. 3,944/-.

SIND

(a) Seed Distribution and Extension Scheme.—This scheme was sanctioned in December 1930, for a period of three years and came into operation in April 1931. It was extended in August 1933, for five years from the 1st April, 1934, and in November 1938, a further extension for two years was sanctioned. In August 1940, it was extended for a further period of five years from the 1st April, 1941.

The main objects of the scheme are:—

(a) Varietal tests of improved strains—Sind American cottons.

(b) Trials of high quality cottons—Egyptians and imported American cottons.
(c) Demonstration of cotton cultivation on non-cotton growing areas of new barrage lands.
(d) Seed multiplication, distribution and extension work.
(e) Propaganda, demonstration and advisory work in connection with the extension of improved varieties of cotton and better methods of cultivation.
(f) Assistance to cotton growers in marketing cotton.

The work on the Right Bank mainly consists of the extension of cotton cultivation, while on the Left Bank, attention is largely devoted to seed multiplication and distribution of improved varieties of cotton and the introduction of better methods of cultivation.

During the year under review, 12,150 maunds of seed of Sind-Sudhar and 33,300 maunds of M.4 seed were distributed by the Department on the Left Bank against 22,600 maunds of Sind-Sudhar 49,000 maunds of M.4 distributed last year. The total area under cotton in Sind is estimated at 9,00,000 acres against 8,99,365 acres in the previous year, the area under improved varieties on the Left Bank being 5,20,000 acres (1,45,000 acres under Sind-Sudhar and 3,75,000 acres under M.4) and that on the Right Bank, 3,700 acres. The percentage of the area under improved strains was 62.3 of the total cotton area against 74.4 in 1943-44. The reason for the fall has not been given. The short staple *desi* varieties are reported to have been almost completely replaced by American varieties on the Left Bank.

Certified *kapas* on the Left Bank fetched a premium of Rs. 0-8-0 per maund. The gross extra income to the growers on the Right Bank is estimated at Rs. 51,800/-.

(b) Financing of Seed Distribution.—This scheme was sanctioned by the Committee in January 1938, for a period of three years, subject to the condition that it would not be put into operation until the Rules under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, have been brought into force. This condition was fulfilled on 18th April, 1941, and the scheme came into operation in January, 1942. In July 1944 it was

extended for a period of one year and three months, up to the 31st March, 1946.

The object of the scheme is (1) to establish a compact block of improved varieties of long staple cotton in Sind, (2) to make large quantities of pure seed available to the cultivators and (3) to provide an organisation for effective distribution of seed even to the remotest corners of the cotton zones.

During the year under report, the areas rogued on the Left Bank under departmental control were as follows:—

	Sind Sudhar (acres)	M-4 (acres)	Total. (acres)
(*a*) Government Farms	64	90	154
(*b*) Selected big growers	8,600	16,200	24,800
(*c*) General	27,528	34,304	61,832
Total ..	36,192	50,594	86,786

On account of its satisfactory performance under varied conditions in all parts of the Province, including Nawabshah district, where other American types have failed and its earlier maturation than Sind-Sudhar by 30 days as a result of which it escapes bollworm attack and damage by early frosts, it is reported that M-4 strain has become more popular than Sind-Sudhar. The quantity of pure seed purchased by the Department for distribution is shown below:—

	Left Bank (mds.)	Right Bank. (mds.)
Sind Sudhar	12,150	....
M-4	33,300	1,240
	45,450	1,240

Ginning and pressing were supervised by the Department and certificates of purity were issued for full pressed bales in exchange for similar certificates issued for kapas. Certified lint fetched a premium of Rs. 3/- per maund for ginners; out of this, the growers received from the ginners about 8 annas per maund for kapas. It is stated that the ginners did not pay any extra premium for certified

M-4 kapas and that the demand from them for certified Sind-Sudhar kapas was better than that for M-4 kapas.

CENTRAL PROVINCES AND BERAR

(a) Verum Seed Distribution and Marketing Scheme.—In November 1929, the Committee sanctioned, for a period of one year in the first instance, the Central Provinces Verum Seed Distribution and Extension Scheme. It started work in September 1930, and was extended annually up to the end of July 1934, when it was combined with the newly sanctioned scheme for the extension of long staple cottons in the Central Provinces. The combined scheme, known as "Scheme for Extension of Long Staple Cotton and Marketing of Verum cotton in the Central Provinces and Berar" was sanctioned for five years from June 1934. At the meeting of the Committee held in July 1938, it was extended up to the 31st May, 1941, the title being changed to "Scheme for the Extension and Marketing of V.434 cotton." In January 1941, a further extension up to 29th February, 1944, was sanctioned, and again in January 1944, the scheme was extended for a further period of one year from the 1st March, 1944. The scheme terminated on the 28th February, 1945. The scheme aimed at the extension of area under V.434 cotton in the seven taluqs where Verum had made most headway. In the past, the ultimate object being to eliminate all other varieties as far as possible. During the extension period, the objective was to raise the area in six of the seven taluqs (excluding Ellichpur) to 5 lakhs of acres.

During the year under report 8,809 maunds of seed were distributed in the 3 taluqs from Departmental and other agencies and the area so covered in the 3 taluqs was 53,500 acres under Departmental spread and 1,03,400 under natural spread. The number of bales of Verum 434 sold through the Departmental pools was 2130-1/2, the average premium realised being Rs. 30/8/- on Jarila I.C. Contract. The total area under Verum 434 in the Province was estimated at 3,77,934 acres. The extra gross income accruing to the growers in the three taluqs and from a further 2,21,034 acres outside these taluqs is estimated at Rs. 48,55,800/-. 21,406 maunds of seed of Verum 434 were collected in the pools and will be utilised for sowing in the ensuing year.

(b) Scheme for distribution and marketing of Jarila Cotton in Central Provinces and Berar.—A small scheme for the distribution of Jarila seed, sufficient for 1,000 acres each in 17 tahsils and for roguing the area thoroughly, was sanctioned by the Committee in January 1943, for a period of one year. It came into operation in September 1943. The present scheme was sanctioned in January 1944, for a period of three years from the 1st March 1944. Its object is to arrange for the distribution of pure seed of Jarila in Berar, excluding the Pusad taluq, covering an area of two lakhs acres.

During the year under report, a total area of 13,79,850 acres was grown with Jarila of which 13,200 acres against 8,000 acres originally programmed, were covered with 2,238 mds. of pure seed of stages III and IV, distributed by the Agricultural Department. A total quantity of 7,148 mds. of seed of stages III and IV was stocked for sowing about 43,000 acres in the 1945-46 season. In all, 3,215 bales were produced and the average price obtained per *khandi* of lint on F.O.R. Bombay basis was Rs. 470/1/-; the premium thus realised over the average Indian Cotton Contract price was Rs. 26/8/-. The gross extra income realized by the growers of Jarila is estimated at Rs. 97,02,802/6/-.

MADRAS

(a) Co. 3 Seed Distribution Scheme.—This scheme, which replaced the Madras Co.2 seed distribution scheme, was sanctioned in January 1942, for a period of four years and five months. It came into operation in July 1942. Its object is to improve the present standard of Cambodia cotton in Salem district by replacing the existing Co.1 and Co.2 cotton strains with Co.3.

During the year under report, 3,71,500 lbs. of seed of Co.3 were distributed to cover an area of 18,570 acres. The area maintained under seed farm conditions by the Agricultural Department and the three crop marketing societies of Tiruchengode, Rasipuram and Salem, was 494 acres and 3670 acres, respectively. Of the 3670 acres, 1200 acres were ploughed up owing to stagnation of water after heavy rains. In all, 88 candies of lint were obtained from the produce of the seed farm and these were sold at a premium of Rs. 120/- per candy over the local Cambodia. The cultivators are reported to have benefited to the extent of Rs. 25/- per acre on an average on

account of higher yield and higher premia obtained for the lint; the total gain to the growers of Co.3 is thus estimated at Rs. 4,64,250/-. A seed farm area of 2250 acres is proposed to be maintained in each of the three taluks, Tiruchengode, Salem and Rasipuram.

(b) Scheme for Distribution of H.1 Strain in the Western Area. —This Scheme, which was sanctioned by the Committee in July 1941, started work in July 1942, in three selected centres, viz., Bellary, Adoni and Guntakal. The object of the scheme is to organise the multiplication and distribution of H.1 cotton seed over 2,00,000 acres in the 4th year, in the three areas of Adoni, Guntakal and Bellary of the Westerns tract of the Madras Province.

The Agricultural Department has been maintaining an area of 3,000 acres for the multiplication of H.1 seed and the seed obtained from it is utilised for sowing the outer seed farm area under the scheme. For purposes of large scale production and distribution of pure seed, the tract is divided into three convenient areas with centres at Adoni, Guntakal and Bellary. Under Departmental supervision, the seed farms in the areas in question are sown, rogued, the produce collected and ginned, and the lint sold through the Co-operative Societies. The cleaned seed obtained from the produce is handed over to the societies for sale.

During the year under review, the H.1 strain was multiplied over a total area of 19,418 acres at Adoni, Bellary and Guntakal against 22,500 acres originally programmed. A total quantity of 583,440 lbs. of seed, sufficient to cover an area of 58,344 acres, was stocked at a number of sale centres distributed over the tract. It is stated that, to effect wider distribution of seed, arrangements were made to open more sale centres and to offer the seed at only annas eight over the market rate. An attempt was also made to exchange pure seed produced in the scheme with the seed of unselected bulk of the growers. Out of 206 *nagas* (1 *naga*=312 lbs.) of lint obtained in Bellary and Adoni from the seed farm produce, 138 nagas were sold through co-operative societies, the premium obtained being Rs. 3 to Rs. 5 per *naga* at Adoni and Rs. 5/- at Bellary, according to the quality of the lint marketed. The gross extra income to the growers of H.1 cotton is estimated at about 16 lakhs of rupees.

(c) Maintenance of Nucleus of pure seed of Improved Varieties of Cotton.—This scheme was sanctioned by the Committee in January 1938, for a period of five years and came into operation in September 1938. In July 1943 it was extended for a further period of five years for the maintenance of nucleus of the four strains Co.2, Co.4, K.1 and N.14.

The area selected and the quantity of selfed seed produced of each variety during the year are given below:—

Name of variety.	Area selfed.	Quantity of selfed seed produced.	How disposed of.
	Acres.	lbs.	
Co. 2	1	462	Sown in multiplication plot of Central Farm.
Co. 4	0.70	173	To be sown in multiplication plot in the Agricultural Research Station at Palur.
K. 1	2	307	To be sown in multiplication plot in the Agricultural Research Station at Koilpatti.
N. 14	1	106	To be sown in multiplication plot in the Agricultural Research Station at Nandyal.

UNITED PROVINCES

Scheme for Distribution, Extension and Marketing of Perso-American Cotton in Western United Provinces.—This scheme was sanctioned in January 1942 for a period of four years. The agricultural and marketing part of the scheme came into operation on the 6th May, 1942.

The objects of the scheme are (i) to multiply pure seed of Perso-American cotton for large scale distribution and to extend its cultivation over suitable areas in the districts of Aligarh, Bulandshahr and parts of Meerut, Muttra and Etah and (ii) to organise the marketing and grading of Perso-American produce through co-operative sale societies and other agencies.

Notwithstanding unfavourable seasonal conditions, the average yield of Perso-American, during the year, is estimated at about -/12/- in the rupee; this works out to about 4 maunds per acre against 3 maunds in the previous season. The produce obtained from stages III and IV was purchased by the Agricultural Department at a pre-

mium of Rs. 5 to Rs. 11 per maund of kapas over *desi* cotton. The quantity of 8,492 maunds of pure seed secured in Stage V will suffice for an area of 40,000 acres next year.

During the year under report, 220 bales produced from the kapas of stages I to IV, purchased by the Department, were sold at a premium of Rs. 88/- per candy over Jarila. Perso-American lint fetched Rs. 35/- to Rs. 38/- per maund more than *desi*. The gross extra income to the cultivators is estimated at Rs. 6,00,101/- from an area of 22,591 acres. Of 737 bales pressed from stage V of the produce purchased by the Co-operative Societies, about 266 were sold at a premium of Rs. 88/- over Jarila. The Aligarh District Cotton Purchase and Sale Society is reported to have made a profit of about Rs. 15,000/- and a bonus of Re. 1/- per maund is proposed to be distributed to the growers.

BARODA STATE

(a) Baroda (Navsari) Seed Distribution Scheme.—This scheme is concerned with the spread of 1027 A. L. F. over an area of 2,10,000 acres in the Navsari district of the Baroda State. It was sanctioned in February 1933, for a period of five years, subject to the condition that the Baroda Government would arrange a seed multiplication area of 1,000 to 2,000 acres in that district. At the meeting of the Committee in July 1938, the scheme was extended for a period of five years and again in July 1943, for a further period of one year from the 16th April, 1944. The scheme, however, terminated on the 31st March, 1945, and is now replaced by the new scheme for the distribution of *Suyog* (Seg. 8-1) cotton seed.

The quantity of seed distributed, the area covered by the variety and controlled by the Agricultural Department and the percentage of the total area under 1027 A.L.F. cotton during the 11 years the scheme was in operation, are given in the statement on page 82.

The most important step taken to extend the variety over the whole of Navsari district is stated to be the passing of the Cotton Control Act in 1941 which provided that, except under a permit, no cotton seed other than that of genuine 1027 A.L.F. could be sown in the Navsari district of the Baroda state. As a result, the area sown in 1941-42 under this variety was 2,52,863 acres against 80,000 acres in the preceding year. Owing, however, to the "Grow More Food

S No.	Year.	Seed depots opened.	Seed Distribution in lbs.	Area sown in acres.	Controlled area by the Dept. in acres.	P. C. under 1027 cotton of the total area in the Dist.
1	2	3	4	5	6	7
1	1934-35	5	231285	18382	5382	9
2	1935-36	12	1020534	74456	4956	40
3	1936-37	8	314432	75000	5250	33
4	1937-38	8	469514	50000	18594	23
5	1938-39	8	449787	50000	8200	22
6	1939-40	11	300798	75000	30000	37
7	1940-41	21	2696925	80000	40000	40
8	1941-42	21	3747942	252863	46955	90
9	1942-43	21	2656500	210000	31655	90
10	1943-44	21	2266785	165000	17312	82
11	1944-45	21	1080825	160000	24236	82*

*Because of more area under food crops.

Crops" campaign, the cotton area in the State was compulsorily reduced by nearly 25%, the decrease of area in the case of 1027 A.L.F. in the Navsari district being to 2,10,000, 1,65,000 and 1,60,000 acres in the three years, 1942-43, 1943-44, and 1944-45, respectively.

The produce in the district has gained a reputation for its standard of purity and is appreciated by the trade. The gross extra income obtained by the cultivators of this variety since 1940-41 is estimated at Rs. 26,18,251/-.

To conform with the cotton policy of the Bombay Department of Agriculture, who are replacing 1027 A.L.F. by Suyog (Seg. 8-1), the Baroda Department of Agriculture undertook experiments to investigate the suitability of the new strain in the Navsari tract. The results showed that Suyog gave 8 to 10% more yield than 1027 A.L.F. and its lint obtained a premium ranging from Rs. 8/- to Rs. 15/- per candy over local. The increased profit to the cultivators of this variety is estimated at Rs. 5 per acre. Accordingly, a new scheme for the replacement of 1027 A.L.F. by Suyog over an area of 2,10,000 acres in Navsari district was sanctioned by the Committee in January 1945, and it came into operation on the 1st April, 1945.

(b) B. 9 Seed Distribution Scheme.—This scheme was sanctioned in July 1941 for a period of five years. It came into operation on the 1st September, 1942. The object of the scheme is to introduce in the areas of Baroda district, not suited to B.D.8, a cotton superior

both in staple and spinning value to the average Broach grown locally.

It will be seen from the report that the Cotton Control Act was applied to Baroda district in April 1943, making the cultivation of B.9 compulsory in Waghodia and Savli talukas. During the year under review, the Department issued 7,30,739 lbs. of B.9 seed (42,500 lbs. of 'A' grade, 2,25,000 lbs. of 'B' grade and 4,63,239 lbs. of commercial type) and 13,380 lbs. of 'Vijaya' seed (600 lbs. of 'A' grade and 12,780 lbs. of 'B' grade) for sowing. The combined area under both the types was 1,04,950 acres, of which 2,992 acres of 'A' grade and 6,858 acres of 'B' grade were certified.

Upto the 31st March, 1945, 1,483 *bhars* of B.9 kapas (486 of 'A' grade and 997 of 'B' grade) and 282 *bhars* of 'Vijaya' cotton (10 of 'A' grade and 272 of 'B' grade) were pooled at different centres. The certified cotton fetched on an average Rs. 4/- more per *bhar* over uncertified cotton; the certified growers thus realised an extra income of Rs. 7,060/-.

For sowing in 1945-46, 18,560 lbs. of B.9 seed (3,840 lbs. of nucleus seed sufficient for 384 acres and 14,720 lbs. sufficient for 1,472 acres) and 6,27,840 lbs. of 'Vijaya' seed (19,200 lbs. of nucleus, sufficient for 1,920 acres, 1,35,040 lbs. of 'A' grade sufficient for 13,504 acres and 4,73,600 lbs. of B grade sufficient for 47,360 acres) have been stocked.

It is reported that in comparative trials conducted at various centres, 'Vijaya' gave better yield than B.9 at all except one locality, viz., Vejpur, where B.9 will continue to be grown. 'Vijaya' is stated to be the type most favoured by the cultivators now, and it has been decided to grow only this cotton in the whole of the Baroda district (except at Vejpur) during 1945-46.

(c) Scheme for creation of a pure Wagad Zone in Mehsana district in Baroda State.—This scheme was sanctioned by the Committee in January 1943 for a period of two years and it came into operation on the 14th December, 1943.

Its object is to spread Wagad 8—a strain of *herbaceum* cotton developed by the Department of Agriculture, Bombay—in Mehsana district, over an area of one lakh acres. This variety is reported to be a valuable improvement on the ordinary mixed Wagad type of

cotton grown in Mehsana. It was selected after several years' trials at Jagudan farm and its subsidiary district testing areas under farmers' conditions.

During the year under review, 5,18,710 lbs. of Wagad 8 seed (69,550 lbs. of 'A' grade and 4,49,160 lbs. of 'B' grade) and 27,995 lbs. of Wagotar seed were distributed by the Agricultural Department for sowing. The area covered with pure seed of Wagad 8 was 24,963 acres, of which, 4,963 acres were controlled by the Department. An additional area of 646 acres of 'A' grade Wagotar cotton was also certified. It is stated that the total area under cotton during the year was 47,100 acres against the normal 100,000 acres in the Wagad zone of Mehsana district. This reduction is attributed chiefly to the 'Grow-More-Food' campaign, low prices for cotton and continuous rains. Wagotar, however, is said to be making a headway owing to its good yield and high ginning percentage.

(d) Scheme for distribution and multiplication of Vijaya cotton in Baroda State.—This scheme was sanctioned by the Committee in January, 1944, for a period of five years and it came into operation on the 1st April, 1944. It aims at the replacement of B.D.8 cotton by Vijaya over approximately 3,00,000 acres in the black soil areas of Baroda State.

It is reported that, during the year, the State enforced the Cotton Control Act, under which the cultivation of Vijaya cotton in the whole of the Baroda district is obligatory. During the year, 3,68,709 lbs. of Vijaya seed were issued for sowing over an area of 36,958 acres, of which 33,572 acres (10,066 acres of A grade and 23,506 acres of B grade) were controlled and certified. It is reported that owing to unfavourable seasonal conditions, the cotton suffered both as regards ginning % and staple length. The yield obtained was also poor in the earlier part of the picking season. Of the 11,236 *bhars* (12 B. mds.) of *kapas* were obtained from the A and B grade areas, 10,121 bales were pressed from it and certified with agmark labels The premium obtained for Vijaya seed cotton was on an average Rs. 20/- more per bhar than that obtained for B.D.8, and that for Vijaya lint varied from Rs. 25/- to Rs. 65/- per candy over the quotation for Jarila. The gross extra income to the growers of Vijaya cotton is estimated at Rs. 5,17,412/- at Rs. 14/- per acre. For distribution in the coming season 40,41,600 lbs. of seed have been stocked.

CHAPTER VI.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON.

The area under improved varieties of cotton during the year under review was 7,786,000 acres or 52% of the total cotton area as compared with 9,893,000 acres or 48% of the total in the previous year. While the percentage of the area under improved varieties to the total acreage during the year under review showed an increase as compared with the previous year, there was a shrinkage in the actual area under improved varieties due mainly to the reduction of the cotton acreage, particularly in the Bombay Province, as a result of the 'Grow-more-food' campaign. In accordance with the policy of increasing the production of better staple cottons, the improved varieties disseminated were mostly of medium and long staple. This policy has resulted in raising the average staple of the Indian cotton crop as will be seen from the following table in which an attempt is made to classify the Indian cotton crop according to varieties and staple lengths.

(Quantities are in thousand bales* of 400 lbs. each.)

Description of cotton	Average 1922-27	Average 1939-44	1944-45.	% increase (+) or decrease (−) of col. 4 over col. 2
1	2	3	4	5
Short staple—below 7/8".				
(1) Bengals	905	864	555	
(2) Oomras	1,890	918	143	
(3) Central India	324	246	154	
(4) Broach (Part)	65	205	36	
(5) Dholleras	525	304	134	
(6) Kumpta and Upland (Part) ..	(*a*)	40	43	
(7) Bijapur and Bagalkot Jowari ..	(*b*)	124	..	
(8) Westerns (Part)			53	
(9) Warangal and Cocanadas	49	33	23	
(10) Salems	30	7	5	
(11) Chinnapathi	39		1	
(12) Comillas		43	44	
Total Short staple .. .. Quantity	3,827	2,804	1,191	—69
% on "Total—All staples" ..	70	52	34	

*Statistical bales containing 400 lbs. of cleaned (lint) cotton.

(*a*) Included under item (19) separate figures not being available.

(*b*) ,, ,, (20) ,, ,, ,, ,,

Description of cotton.	Average 1922-27	Average 1939-44	1944-45	%increase (+) or decrease (—) of col. 4 over col. 2
1	2	3	4	5
Medium & Long staple—7/8" & above.—				
(13) Americans—Punjab and Sind (staple, 1" and above)* ..	....	350	259	
(14) Americans—Punjab and Sind (staple below 1")	264	933	940	
(15) C. P. and Berar Verum	....	93	62	
(16) Hyderabad Gaorani	332	146	81	
(17) Broach (Part)	214	38	76	
(18) Surti		148	60	
(19) Kumpta and Upland (Part) ..	259	186	120	
(20) Westerns (Part)		42	45	
(21) White and Red Northerns ..	251	20	12	
(22) Tinnevellies (including Karungannies)	155	152	128	
(23) Cambodias	147	222	158	
(24) Jarila	....	257	350	
(25) Buri	....	43	53	
(26) Perso-American	....	....	7	
Total—Medium & Long staple. Quantity	1,622	2,630	2,351	+45
% on Total All Staples	30	48	66	
Total—All Staples	5,449	5,434	3,542	—35

*Includes 'Punjab-American 289F/K.25,' Sind Sudhar (Sind-American 289F-1) and 'Punjab-American 289F/43.'

It will be seen that the proportion of cotton of staple length 7/8" and above to the total production increased from 30% in the quinquennium 1922-27 to 48% in the quinquennium 1939-44; the proportion in 1944-45 was 66% against 62% in 1943-44. The production of 'medium and long staple' cotton in 1944-45 increased by 729,000 bales or 45% as compared with 1922-27; under "short staple" there was a reduction of 2,636,000 bales or 69%. The production of cotton of staple length '1" and above,' which was *nil* in 1922-27, amounted to 387,000 bales in 1944-45.

In tackling the question of improving the quality of Indian cotton, the importance of raising the yield per acre has not been overlooked. A notable increase in yield has already been achieved as will be evident from the following table, in which two sets of figures of yield, one based on the official crop forecasts and the other on the figures of actual crop accounted for by mill consumption, exports and extra-factory consumption, are given:—

Year (1st Sept.—31st Aug.)	Area (Thousand acres.)	Production Government estimates (Thousand bales of 400 lbs. each.)	Yield per acre (lbs.) Col. 3 / Col. 2.	Approximate (commercial crop. (Thousand bales of 400 lbs. each.)	Yield per acre calculated from approximate (commercial) crop. (lbs.) Col. 5. / Col. 2.
1	2	3	4	5	6
Average 1922-27 ..	24,723	5,449	87	*5,954	96
,, 1927-32 ..	24,738	5,206	84	*5,851	95
,, 1932-37 ..	23,912	5,315	89	*6,447	108
1937-38 ..	25,746	5,737	89	†6,370	99
1938-39 ..	23,490	5,051	86	†6,051	103
1939-40 ..	21,580	4,909	91	†5,884	109
1940-41 ..	23,311	6,080	104	†7,032	121
1941-42 ..	24,151	6,223	103	†6,949	115
Average 1937-42 ..	23,656	5,600	95	†6,457	109
1942-43 ..	19,203	4,702	98	†4,961	103
1943-44 ..	21,086	5,258	100	†5,723	112
1944-45 ..	14,859	3,542	95	‡4,500	121

* Calculated from mill consumption (*a*) exports (*b*) † extra-factory consumption (*c*). Variation in stocks has not, however, been taken into account.

(*a*) Mill consumption in Burma included up to 31st March, 1937.

(*b*) Includes exports from Burma up to 1934-35.

(*c*) The new figure for extra-factory consumption, *viz.*, 450,000 bales for the whole of India, based on enquiries conducted by the Committee, in selected areas, has been used throughout.

† Best estimate of the crop as arrived at by the Indian Central Cotton Committee in connection with the annual post-mortem examination of all-India cotton forecasts.

‡ Provisional.

From the second set of figures given in column 6, it will be seen that the average yield per acre rose from 96 lbs. in the quinquennium 1922-27 to 109 lbs. in the quinquennium 1937-42. The average yield in 1944-45 was 121 lbs. per acre against 112 lbs. in 1943-44.

The main criterion in a general policy of cotton improvement must, however, be the return to the grower from the varieties recommended for cultivation by the Provincial and State Departments of Agriculture. This criterion has always been upheld by the Committee as of primary importance. Although exact data regarding the total additional benefit derived by the cultivators by growing improved types of cotton are not available, there is little doubt that

the gain has been considerable. In 1944-45 according to the figures furnished by the Provincial and State Departments of Agriculture, the gross extra income realised by the grower of certain improved varities of cotton, covering an area of about 32 lakhs acres, amounted to roughly two and a half crores of rupees. This works out to Rs. 8/- per acre on the average, and on this basis, the total increased income, accrued to the cultivators in 1944-45, by growing improved cottons on an area of 7,786,000 acres, may be estimated at about 6.22 crores of rupees.

The progress made in the introduction of improved varieties of cotton in the various provinces and States of India as a result of the joint efforts of the Indian Central Cotton Committee and the Provincial and State Departments of Agriculture is summarised in the following paragraphs.

BOMBAY

The total estimated area under cotton in the Bombay Province during the year 1944-45 was 22,35,895 acres including 8,81,437 acres in the Indian States as reported in the final cotton forecast for 1944-45 season.

Broach tract.—During the year, the Agricultural Department controlled 19,660 acres of Suyog and 8,540 acres of 1027 A.L.F. for seed multiplication including 658 acres grown with Farm Pedigree Suyog and 140 acres with Farm Pedigree 1027 A.L.F. The Department purchased in all 581,757 lbs. of Suyog seed of which 17,340 lbs. were the produce of the Surat farm. This stock was distributed in the District through depots in the interior. In addition the Nana-Varachha and Sonsak Co-operative Cotton Sale Societies supplied 4,45,204 lbs. of Suyog seed direct to their own members as well as to those of other Cotton Sale Societies in the tract. Thus the total quantity of Suyog handled was 10,26,961 lbs. The Department also purchased 9,00,668 lbs. 1027 A.L.F. seed of which 8,236 lbs. were the produce of the Surat Farm. Further 1,49,268 lbs. were supplied direct to their members by the Hansot Co-operative Cotton Sale Society and the Purchase and Sale Union, Nawapur. Thus the total quantity of 1027 A.L.F. handled was 10,49,976 lbs. Out of this, 7,15,066 lbs. were supplied to the Chhota-Udepur and Baria States and others

outside the areas. The remaining quantity of seed was distributed through depots in parts of the Anklesvar and Nawapur talukas.

The amended Cotton Transport Act of 1923, restricting the transport of seed cotton and cotton seed from the North of the river Tapti into the Surat area, remained in force during the year.

The Bombay Cotton Control Act of 1935, was repealed during the year and replaced by the Bombay Cotton Control Act of 1942. This Act has for its object the regulation and prohibition of the cultivation of any variety of cotton, the mixing of prohibited varieties of cotton with other cottons and the possession or use of, or trade in the prohibited variety of cotton in any part of the Province of Bombay.

During the year, 4,087 bales of Suyog and 975 bales of 1027 A.L.F. were agmarked under the Grading and Marking Act of 1937. Out of these 2,816 bales of Suyog and 324 bales of 1027 A.L.F. were sold at premiums varying from Rs. 11/- to Rs. 25/- over local for Suyog and Rs. 14/- to Rs. Rs. 25/- for 1027 A.L.F. leaving an unsold balance of 1,271 bales of Suyog and 651 bales of 1027 A.L.F.

The marketing of Suyog Agarmarked certified bales was satisfactory and remunerative to growers on account of the high ginning percentage of this variety. Agmarking of 1027 A.L.F. was limited to a few centres in view of the policy to cover the tract with Suyog.

"Vijaya" is the new type of cotton that is being introduced in the Broach Tract, i.e., the cotton area lying between the rivers Nurbuda in the South and the Sabarmati in the north. During the previous year, great difficulty was experienced in disposing of this variety as that was the first year of its being put on the market. In the year under report, the variety was disposed of easily and at an adequate price, as the trade had become convinced of its intrinsic value.

For seed multiplication purposes the Agricultural Department controlled 11,051 acres of Vijaya cotton, including 259 acres grown with Farm Pedigree seed from the Broach Farm and Registered seed growers.

The Agricultural Department purchased and distributed through five depots 2,54,570 lbs. of Vijaya cotton seed, out of which 1,220 lbs. were the produce of the Broach Farm. Besides, 4,70,960 lbs. were

supplied direct, under Departmental guidance, to the growers in parts of Ahmedabad, Kaira and Broach Districts by Co-operative Cotton Sale and seed supply societies in Broach District. The total quantity of seed handled, during the year was thus only 7,34,530 lbs. as against 13,28,376 lbs. in the previous year. This was due to the application of the Bombay Growth of Food Crops Act.

Wagad tract.—Wagotar cotton which has been introduced for general cultivation in Wagad Tract of Ahmedabad District is superior to the local cotton in fineness of staple, ginning outturn, spinning capacity and yield per acre. It is suited to the conditions in Wagad tract and is appreciated by the cultivators as well as the trade. A scheme, financed jointly by the Indian Central Cotton Committee and the Government of Bombay, for the multiplication and distribution of the seed of this variety, was launched two years ago. The total area under cotton in the Wagad tract during 1944-45 was 1,20,000 acres against the normal acreage of 3,50,000 acres. During the year 1,04,000 lbs. of seed were secured from the controlled area. Out of this, 29,000 lbs. were distributed by the Department, 43,000 lbs. by the approved agents and about 32,000 lbs. were sold direct to the merchants by the farmers. The area under Wagotar was expected to be 3,600 acres but, owing to heavy rainfall, resulting in water-logged conditions of the soil, the final acreage under Wagotar was 560 acres (all controlled); this area was concentrated in three talukas, viz., Viramgam, Dholka and Dhandhuka in blocks of 410 acres, 80 acres and 70 acres, respectively.

Khandesh.—Jarila cotton which has been introduced for general cultivation in Khandesh is superior to the local or Banilla in staple and is highly wilt-resistant. Its yield and ginning outturn are equal to those of the local type. It is suited to the conditions obtaining in Khandesh and is appreciated by the cultivators as well as the trade. The year under report is the eighth year of a scheme financed jointly by the Indian Central Cotton Committee and the Government of Bombay, for the multiplication and distribution of the seed of this variety. During the year 1944-45, 4,12,360 lbs. and 7,84,040 lbs. of Jarila cotton seed were stocked respectively by the Department and the 40 approved stockists. Out of these 4,770,070 lbs. of seed were distributed in the Division, the area covered being 2,31,362 acres of which an area of 64,005 acres under stages III, IV and V was organiz-

ed for multiplication. In addition, an area of 111 acres 15 *gunthas* was grown under this variety on Jalgaon and Mamurabad seed farms (near Jalgaon Farm) under stages I and II.

The total area under Jarila including that under natural spread, is estimated at about 3,44,267 acres, i.e., 99.5 per cent of the Oomras area in Khandesh. Other cottons covered some 1523 acres. The area under cotton decreased during the year due to (i) the application of the Bombay Growth of Food Crops Act, 1944, (ii) less demand for cotton, (iii) low trend of cotton prices, (iv) better prices for groundnut, and (v) the lateness of season for sowing cotton. Out of the pure seed produced on the Government Farms and the controlled areas, 60,37,994 lbs. of Jarila have been stocked by the Department, Co-operative Banks, Societies and Taluka Development Associations for distribution during the season 1945-46. The production of Jarila including natural spread is estimated at 56,000 bales or approximately 64 lbs. of lint per acre.

The season was unusual owing to uneven distribution of rainfall. It was later by 3 to 4 weeks but immediately after sowing, there was continuous heavy rain for about a month which reacted adversely on the yield and quality of Jarila. On an average, the prices realized by growers of Jarila cotton during the season 1944-45 varied from Rs. 4/- to Rs. 60/- over the ruling quotations for Jarila in Bombay. Transport difficulties continued as in the past season, though the demand for Jarila cotton was better than in the previous year.

As reported last year, the Cotton Control Act has been applied to the whole of East Khandesh district, the West Khandesh district excluding the Nandurbar and Taloda and Nawapur peta, and the talukas of Malegaon, Nandgaon, Baglan, Kalwan and Yeola of Nasik district. The question of the application of the Cotton Transport Act is under consideration and if introduced, will apply in the first instance to imports of cotton by rail. As mentioned in last year's report, there are now 20 Co-operative Cotton Sale Societies for marketing and agmarking pure Jarila cotton in the Division. The work of agmarking could not be taken up as the members of these Societies sold their cotton after ginning without pressing owing to limited production.

There was no controlled area under Banilla cotton during the year and this variety has now completely disappeared.

Deccan—Barsi-Nagar Tract.—In this tract, for the present, there is no scheme for multiplication and distribution of Jarila cotton which has been found to be suitable for this tract. On account of intensive "Grow More Food Campaign", better prices for foodgrains and the unavailability of pre-seasonal water, the area under Barsi-Nagar dropped considerably. The total area under this crop is estimated at 25,000 acres in 1944-45. The *Jarila* variety has been found to be suitable for this tract and is spreading on its own merits. Nearly 85% of the cotton area has been covered by *Jarila* in the Nagar and Poona districts.

Satara District.—Jayawant cotton is grown in Walava and Tasgaon talukas of the Satara district, where 6,790 lbs. of Jayawant cotton seed, sufficient for about 970 acres, were supplied to the cultivators. The area under natural spread was estimated at 400 acres during the year 1944-45, bringing the total area under Jayavant cotton in the district to about 1370 acres. The premium obtained for graded Jayavant cotton over the ungraded cotton ranged from Rs. 10/- to Rs. 15/- per *nag* (1,344 lbs.) of *kapas*.

Sholapur District.—The monsoon started at the right time and the sowing of the cotton crop was done in August, 1944. The crop suffered for want of rains in August, 1944, but there was improvement in the condition of the crop after the September rains. The total cotton area was 580 acres, against 12,945, acres in the previous year. Out of this, the area under Jarila was 200 acres and that under local 380 acres. The reduction in the cotton area in the Satara and Sholapur districts is due to increase in the area under food crops as a result of the application of the Bombay Growth of Food Crops Act.

Kumpta Dharwar Tract.—The work of extending the two improved varieties of cotton, viz., Jayawant and Gadag No. 1, was carried out in 13 centres through the approved agents, the Hubli, Gadag, Naregal, Annigeri, Dharwar, Nargund, Bagalkot and Bijapur Cooperative cotton sale societies and the sale shop at Haveri. The total reserved area organised and rogued for multiplying pure pedigree seed of Jayawant cotton at different centres was 89,785 acres against 1,03,247 acres in the previous year and that of Gadag No. 1 cotton

18,084 acres against 28,475 acres in 1943-44. The quantity of seed secured and stocked by the approved agents and Co-operative bodies from these reserved areas was about 70,00,000 lbs. of Jayawant and 10,00,000 lbs. of Gadag No. 1, sufficient to cover 7,00,000 and 1,00,000 acres, respectively, during 1945-46. As a result of the application of the Bombay Growth of Food Crops Act, there was great contraction in the area under cotton in the Southern Maratha Country. However, adequate quantity of improved cotton seed was stocked to cover all the cotton area with standard variety of cotton seed. Vigorous seed propaganda was made in all the centres by holding meetings in most of the villages, and leaflets regarding the application of the Cotton Control Act to the Kumpta-Dharwar Protected area were distributed. Four hundred and fourteen seed depots were opened in the 3 districts, including the States for the distribution of Jayawant and Gadag No. 1 cotton seed stocked by the approved agents and the Co-operative bodies. The general area under pure Jayawant was 3,28,045 acres against 4,15,226 acres last year and that under pure Gadag No. 1 49,916 acres against 1,30,125 acres in the previous year. The total area under Jayawant and Gadag No. 1 was 4,17,830 acres and 68,000 acres as against 5,18,500 and 1,18,600 acres, respectively, last year. Besides, about 2,00,000 acres under Jayawant and about 50,000 acres under Gadag No. 1 were covered by natural spread, i.e., the produce of the seed stocked by the cultivators. The total area under Jayawant was thus 6,17,830 acres and that under Gadag No. 1 1,18,000 acres, making a total of 7,35,830 acres. The estimated yield of Jayawant cotton was about 77,000 bales against 90,000 bales in the past year and that of Gadag No. 1 was 15,000 bales against 20,000 bales last year.

Attempts were made to pool the produce of the reserved and general area in all the up-country markets and the stuff thus pooled was graded as usual by the cotton staff and sold by auction sale. A premium of Rs. 15/- per *nag* (1344 lbs.) of seed cotton in the case of Jayawant and Rs. 20/- per *nag* in the case of Gadag No. 1 was obtained in auction sales over the market rates. The extra profit secured to the cultivators by selling their produce through auction sales was estimated at Rs. 2,70,000/-. Besides, the cultivators were benefited by selling their produce even in private sales, as all the area was covered with improved strains during 1944-45 season.

'Agmark' work was continued on an optional basis; two grade specifications, viz., 'Agmark certified pedigree' and 'Agmark certified' were arranged for and labels given accordingly for the cotton from the reserved and the general areas. Up to the end of June 1945, 7,215 bales of Jayawant cotton and 761 bales of Gadag No. 1 cotton were pressed under Agmark.

SIND.

The total area under cotton in Sind during the year 1944-45 was 9,01,615 acres (including Khairpur State) against 8,99,365 acres in the previous year. The acreage under American and *desi* was as follows:—

	British Dists Acres.	Khairpur State Acres.
American cotton	8,31,884	20,545
Desi cotton..	48,377	809
Total ..	8,80,261	+21,354

During the year, the crop which was promising at the beginning of the season, was adversely affected by unusually heavy and continuous rains during the months of July, August and September 1944.

A. **Sind American Cotton:**—There are three improved strains of Sind-American Cotton which are widely cultivated in different tracts of the Province.

1. **Sind Sudhar** (*G. hirsutum*):—This improved variety is mainly grown in the Tharparkar and Hyderabad districts and occupied an area of about 1,80,000 acres during the season 1944-45 against 3,65,000 acres in the previous year. The fall in acreage was due to the very rapid increase in the area under the new strain M.4. Sind Sudhar possesses a staple length of 1″, gins 29 to 30% and spins 40s highest standard warp counts; its lint which is of cream colour has a silky feel.

2. **M-4** (*G. hirsutum*):—This variety has been evolved from N.T.21 (bulk). It is now grown all over Sind, the season under report being the fourth year of its introduction. Owing to its early maturity and high yield, its spread has been very rapid. The area covered by it during the year was about 4,30,000 acres against

1,95,000 acres in the past year. M-4 has a staple length of 7/8", a ginning outturn of 33% and a spinning capacity of 36s highest standard warp counts. The lint is bright, white in colour but of roughish feel.

3. **Sind American 98.** (*G. hirsutum*):—This variety which has been mainly confined to the Indus Right Bank is now almost completely replaced by M-4; the area occupied by it during the year under report, was only some 5,000 acres. It has a staple of 7/8", a ginning outturn of 33% and a spinning value of 34s highest standard warp counts. The lint is not as rough as that of M.4.

B. **Sind—N.R.** (*G. arboreum* var *neglectum* forma *bengalensis*): This is an improved short staple strain evolved from *desi* cottons. It has a staple of a little over 1/2 inch and ginning outturn of about 38%. It spins 6s highest standard warp counts. To discouraging its cultivation, distribution of its pure seed was stopped by the Sind Agricultural Department in 1943-44. The area under this strain, now solely confined to the Nawabshah district, was 28,000 acres.

The following quantities of seed of improved varieties were controlled and distributed by the Agricultural Department during 1944-45:—

Variety.	By the Agrl. Department.	By the factories directly.	Total.
	mds.	mds.	mds.
Sind-Sudhar	22,600	25,000	47,600
M—4	49,000	75,000	1,24,000
4F—98	200	200	400
Total ..	71,800	1,00,200	1,72,000

PUNJAB.

The total area under cotton in the British districts of the Punjab was estimated at 2,421,280 acres, which is 7 per cent less than the actual area of last year. Of the total area, 713,050 acres were grown under *desi* varieties and 1,708,230 acres under the medium and long stapled American varieties. The American varieties thus constituted about 70.5% of the total Punjab cotton crop, the highest proportion ever yet attained by such sorts. The total outturn was estimated at 9,37,300 bales (*desi* 271,900 bales and American 6,65,400 bales), which is about 10 per cent less than the crop of the last year.

Punjab Desi Cotton.—The campaign instituted by the Government for increasing the area under food crops in preference to short stapled *desi* cottons, brought down the area under these cottons by 6.4% as compared to last year. The big disparity in prices between the *desi* and American varieties also contributed to this reduction. Amongst the improved varieties of *desi* cottons grown in the Province, 39 Mollisoni was popular in the Central Canal Colonies, Mollisoni 6042 in the South Eastern districts and 119 Sanguineum in the South Western parts of the Punjab. The first two varieties together occupied an area of 402,588 acres, which is roughly 56.4% of the total area under *desi* cottons in the Province.

Punjab American Cotton.—The most outstanding feature of the year under report is that for the first time the acreage under the medium stapled 4F, which was hitherto the most extensively cultivated variety, was exceeded by some of the long-stapled varieties recently introduced by the Punjab Department of Agriculture in the various ecological zones of the Province. L.S.S. is now most popular in the districts of Lyallpur, Sheikhupura and Sargodha, while 289F/43 and 289F/K25 are the two principal varieties of the South Western tract, including the districts of Multan, Montgomery, Dera Ghazi Khan and Muzaffargarh. Another noteworthy feature is that a new long stapled variety 124F named "Victory" (staple length 0.97" and ginning % 33.5) has now been approved by the Department for distribution in the tract extending South West of Mian Channu. The total area under these long stapled improved varieties was estimated at 11,76,623 acres which constitutes nearly 68.8% of the total Punjab American Crop. The estimated acreage under each of the commercial Punjab American varieties was as follows:—

	Acres.
4F	5,08,691
L. S. S.	6,12,534
289F, 289F/43 & 289F/K. 25.	3,88,728
Victory (124F)	1,73,515
199F	1,846
Others.	24,104

Nearly 112,339 maunds of cotton seed of which 109,146 maunds were American and 3,193 maunds *desi* were sold by the Agricultural Department to cultivators during the year.

CENTRAL PROVINCES AND BERAR

The total area under cotton in the Central Provinces and Berar during the year 1944-45 was 28.01 lakhs acres against 30.9 lakhs acres in the previous year. The decrease is attributed to the "Grow More Food" campaign. The area under Verum 434 was 3.78 lakhs acres against 5.32 lakhs acres in the previous year. This strain possesses fine, strong staple, about 7/8" in length, capable of spinning up to 30's highest standard warp counts. The average premium obtained in the season 1944-45 was Rs. 30-8-0 per *khandi* of lint "on" Jarila (I.C.C.) 21,406 maunds of seed are distributed for sowing purposes through departmental, co-operative and other agencies. The total area under Buri 107 (*G. hirsutum* was 1.10 lakhs acres, out of which 94,000 acres were grown in the Nimar district from the seed distributed by the Department. This strain possesses fine staple, about 1" in length, capable of spinning up to 40's highest standard warp counts. The total quantity of seed distributed in the Burhanpur tahsil through Government Seed Depots, seed farmers and dealers amounted to 6,213 maunds. The average premium obtained by Buri 107 during the season 1944-45 was Rs. 26-7-0 per *khandi* of *kapas* over *desi kapas*.

MADRAS.

The total area under cotton in the Madras Province during 1944-45, according to the forecast report published in August 1945, was estimated at 16,71,600 acres as against the finally recorded area of 22,10,302 acres in 1943-44. The present estimate reveals a fall of 24.4 per cent compared to the last season. The decrease in area was very marked in the districts of Kurnool, Bellary, Anantapur, Salem, Coimbatore, Madura and Tinnevelly and was attributed to (1) want of timely rains for sowing (2) the restrictions imposed on the cultivation of short staple varieties and (3) the preference shown for the cultivation of food crops.

A. **Cambodia Cotton.**—The area under Cambodia during the year dropped to 343,800 acres from 5,01,100 acres recorded in 1943-44. The improved strains Co.2, Co.3, Co.4, x4463 and 920 continued to be popular and covered an extent of 2,77,010 acres which works out to 80 per cent of the total area under Cambodia. The percentage area under improved varieties remained more or less stable. Strain

Co. 2 being very cosmopolitan occupied the largest individual area and figured in all districts growing Cambodia. The demand for 920 was restricted to a section of cultivators in Madura and Coimbatore districts. The cultivation of X4463 was strictly limited to the early sown portions of Coimbatore district. The spread of Co. 3 in Salem district increased by 50 per cent. The increase under Co. 4 in Madura and Ramnad has been large and it is expected that this variety will eventually be grown as a summer cotton to the exclusion of all other strains. The extent of spread of the different varieties is indicated in Table 1.

TABLE I

Cambodia Cot'on. *Area as per forecast 343,800 acres.*

District.	Name of strain	Quantity of seeds distributed by		Total area under the strain inclusive of natural spread.
		Madras Agricultural Department. lbs.	Co-operative societies. lbs.	acres.
1	2	3	4	5
Madura	Co. 2	25,053	....	41,670
Ramnad		6,370	....	6,120
Tinnevelly		392	....	2,420
South Arcot		501	....	1,000
Chittor		....	....	50
North Arcot		1,217	....	445
Salem		....	....	46,577
Coimbatore		2,14,700	400,000	95,642
Trichinopoly		7,354	....	11,249
Malabar		10,290	....	1,750
Kurnool		1,666	....	82
Anantapur		120	....	80
Cuddapah		516	....	155
Total ..		2,69,179	400,000	2,07,240
South Arcot	Co. 3	4,281	....	500
Chittor		....	....	50
North Arcot		91	....	8
Salem		7,148	76,030	13,570
Trichinopoly		4,343	....	300
Total ..		15,863	76,030	14,428

District.	Name of strain	Quantity of seeds distributed by		Total area under the strain inclusive of natural spread.
		Madras Agricultural Department. lbs.	Co-operative societies. lbs.	acres.
1	2	3	4	5
Madura	Co. 4	11,285	....	11,202
Ramnad		79,874	....	21,062
Tinnevelly		11,216	....	5,295
South Arcot		13,166	....	2,336
North Arcot		201	....	16
Total ..		1,15,742	....	39,911
Madura	920	....	....	19,360
Tinnevelly		....	....	60
Chittor		....	....	150
Coimbatore		21,233	....	30,453
Total ..		21,233	....	50,023
Madura	4463	4,144	....	276
Coimbatore		4,301	....	7,428
Trichinopoly		....	....	400
Total ..		8,445	....	8,104
Grand Total ..		4,30,462	476,030	8,19,706

The agencies which multiplied and organised the sale of pure seeds were (1) The Madras Agricultural Department, for Co.2, x4463, 920 and Co.4, (2) The Co-operative Sale Society, Tiruppur for Co.2 and (3) The subsidised Indian Central Cotton Committee Scheme in Salem district for Co.3.

B. **Tinnevellies.**—The total area under Tinnies recorded during 1944-45 was 5,20,900 acres as against 5,97,500 acres in the previous

season. The decrease was pronounced in Tinnevelly district. The estimated acreage of 2,64,618 acres under improved Karunganni strains (vide Table II) expressed as percentage on total Tinnevellies gives 51% and compares well with the last year's figure of 45.7%. K.1 was the only strain under large scale distribution. The strain C.11-2 was reported to be becoming very popular in the Coimbatore district on account of its better yield and quality. The seed multiplication and distribution of the two strains were done on a limited scale by the Madras Agricultural Department.

TABLE II.

Tinnevellies. *Area as per forecast 520,900 acres.*

District.	Name of strain	Quantity of seeds distributed by		Total area under the strain inclusive of natural spread.
		Madras Agricultural Department. lbs.	Co-operative societies. lbs.	acres.
1	2	3	4	5
Madura	K. 1	19,794	....	11,700
Ramnad		97,832	....	1,08,628
Tinnevelly		1,79,542	....	92,750
North Arcot		185	....	15
Coimbatore		53,398	....	58,177
Total ..		3,50,751	....	2,71,270
Coimbatore	C. 11-2	2,240	....	1,152
Grand Total ..		3,52,991	....	2,72,422

C. **Salem.**—The area dwindled to 23,300 acres during the year from 40,800 acres in 1943-44 mainly as a result of propaganda for "Grow More Food." As there was no special strain evolved or recommended for the area, there was no organisation for the spread of improved varieties. In Trichinopoly district, however, K. 1 is reported to have spread over 820 acres.

D. **White and red Northerns.**—There was a further shrinkage in the area during the year 1944-45 and it was estimated at 114,000 acres. N. 14 was the only strain under distribution but its area remained low due to the absence of any large organisation for the production and distribution of pure seeds. During the year only 1,658 lbs. of seeds were distributed by the Department and the area of 20,200 acres including natural spread was under the variety in Kurnool district.

E. **Westerns.**—The estimated total area of 5,73,000 acres is low compared to the previous total of 7,15,000 acres. The restrictions imposed on the cultivation of *Mungari* cotton, the receipt of favourable rains for the groundnut and the low price of Westerns cotton were largely responsible for the diversion of cotton area to food crops. The reduction in cultivation is profound in the districts of Bellary and Kurnool. The area under improved strain H. 1 was estimated at 2,16,370 acres (vide Table III). Inspite of the working of a subsidised seed distribution scheme for H. 1 in the area, the quantity of seeds distributed has considerably fallen short of last year's target.

TABLE III

Westerns. *Area as per forecast 5,73,000 acres.*

District.	Name of strain	Quantity of seeds distributed by		Total area under the strain inclusive of natural spread.
		Madras Agricultural Department. lbs.	Co-operative societies. lbs.	acres.
1	2	3	4	5
Kurnool	H. 1	2,003	....	5,050
Cuddapah		75,243	....	27,252
Bellary		35,460	2,31,178	1,20,000
Anantapur		1,76,966	....	64,068
Total ..		2,89,672	2,31,178	2,16,370

F. **Warangal and Cocanadas.**—The area estimated during the season under report was 91,700 acres. No special strain suitable for the tract has been evolved yet.

UNITED PROVINCES

The revised final area under cotton in the province during the year 1944-45 amounted to 2,02,237 acres against 372,361 acres (revised) last year, showing a decrease of 170,124 acres or 45.7 per cent. The revised final outturn of the crop (lint) was estimated at 61,700 bales (rounded) of 400 lbs. each against 1,11,900 bales (revised) last year, indicating a decrease of 50,200 bales or about 44.9 per cent. As compared with the average outturn for the preceding five and ten years, the outturn in the year under report showed a decrease of about 54 and 64 per cent, respectively.

Improved varieties.—Although the season under report was favourable for cotton, there was a decrease in the area under the crop largely as a result of the prevailing high prices of food-grains, the "Grow More Food" campaign and the late commencement of the monsoon. The Department continued to distribute the seed of C. 520 an improved variety of *Desi* cotton, to a limited extent. The seed of Perso-American cotton is being distributed under an Extension Scheme operating in the Western Circle. The area sown under Perso-American and C. 520 during 1944-45 in the whole province and the amount of seed distributed by the Department of Agriculture are given in the following table:—

Variety.	Total area under the variety (including natural spread.)	Amount of seed distributed by the Department.
Perso-American	23,210	5415 Maunds.
C. 520	7,519	834 Maunds 16 seers.

Chief characteristics of the improved varieties.—C. 520 cotton is a pure line selection from the 'roseum' type of U.P. Bengals, originally isolated from the material collected in the Saharanpur or Bijnor districts as early as 1920-21. It gives a high yield both under irrigated and unirrigated conditions. When grown on a commercial scale at the Government Cotton Research Farm, Raya (Muttra),

the variety yields about 9 to 10 mds. of *kapas* per acre. It has a staple length of about 0.73", and a ginning percentage of about 30 to 37, and is capable of spinning up to 10 to 12½ highest standard warp counts. It has spread fairly well in the cotton areas, but, owing to the greater attention at present being paid to larger production of food-grains and long-staple cotton, its area is on the decline in the United Provinces. It is in demand in some of the Central India States and Rajputana, and in some areas in Eastern Punjab. The *kapas* of this variety fetches about Rs. 8/- per maund, more than that of the ordinary *desi* under normal trade conditions.

Perso-American cotton is a selection from the American types of cotton imported from Persia (Iran) and acclimatised in the United Provinces. When grown on a commercial scale at Raya and in other suitable areas, e.g., Budam, it gave an yield of from 13 to 14 maunds per acre. It has a staple length of 0.85" and a ginning percentage of 30 to 32 and is capable of spinning up to 28 to 34 highest standard warp counts. The *kapas* of this variety ordinarily fetches a premium of Rs. 2/- to Rs. 4/- per maund on *desi* but during the last three seasons, it fetched a price about 40 to 100 per cent higher than the local *desi* cotton.

HYDERABAD STATE

The total area under cotton in Aurangabad Suba of H.E.H. the Nizam's Dominions during the year 1944-45 was 874,658 acres.

Area under improved varieties of cotton.—(i) *Gaorani* 6 is an improved strain evolved in 1930 by straight selection from the local variety of cotton called Hyderabad Gaorani (*Gossypium arboreum* L. var *neglectum Watt.* Forma *indica* H. & G.). It is superior to the local *Gaorani* in respect of yield of seed-cotton by about 10 per cent; its ginning outturn is 2-3 per cent more and it spins 8 to 10 counts higher. The general distribution of its pure seed was started in 1936-37. In 1944-45, pure seed from the Reserved Area amounting to 55,36,084 lbs. was purchased and distributed to cultivators under Departmental control both on the *taccavi* system and on cash payment. An area of 3,74,316 acres in Mudhol, Biloli, Deglur, Nanded, and Hadgaon taluqs of Nanded district, and Nirmal taluka of Adilabad district was covered by this seed. Reserve areas

of this seed were set up again in Nanded, Mudhol and Biloli talukas and the crop was 'rogued' for maintaining the purity of the seed. The seed expected to be obtained from this Reserve Area would be sufficient to cover all the area in the abovementioned talukas in 1945-46.

(ii) *Gaorani* 6 E-3 is a single-plant selection from Gaorani 6 and is superior to it in some respects. The multiplication work was started in the village of *Badi-buzrug* near Nanded. About 15,371 lbs. of seed of this variety sufficient to cover an area of about 1,000 acres was distributed during the year.

(iii) *Parbhani-American* cotton is a single-plant selection from the locally grown mixture of acclimatised American varieties. Pure seed from the reserve area amounting to 95,840 lbs. was purchased and distributed to cultivators under Departmental control for further multiplication on 9,580 acres in the Ghat tract of Aurangabad District. The seed obtained from this crop will be distributed in the general area in 1945-46.

(iv) *Jarila* cotton is a selection developed by the Bombay Department of Agriculture from *Verum* variety. Seed of Jarila cotton purchased to the extent of 6,29,865 lbs. and distributed to cultivators under Departmental control for an area of 61,970 acres for further multiplication in the plains of Aurangabad.

The Department of Agriculture, H.E.H. the Nizam's Government, has set up a special organisation for seed multiplication, seed distribution and marketing of improved cottons. The predominating features of this organisation are as follows:—

(i) A special staff is maintained by the Department every year to ensure the purity of the crop of the general as well as of the reserve areas. Supervision is maintained throughout the growing period and also at the time of marketing, ginning and pressing of the produce.

(ii) Special *taccavi* grant is provided by the Government every year for purchasing all the needed seed from the reserve areas and for distributing it to the cultivators.

(iii) The purity of the produce of the general as well as the reserve areas is guaranteed to the trade.

(iv) On the strength of both the superiority and guaranteed purity of improved varieties, a premium over the prices of local varieties is secured from the trade. The premium is independent of the fluctuations of the market prices.

With this special organisation, in which collaboration of the interests alike of the cultivator and the purchaser is the key-note, it has been possible to effect a rapid development in the extension of the area under improved varieties.

BARODA STATE.

The total area under cotton in the State during 1944-45 was 4,72,433 acres against 5,84,728 acres in the previous year. The decrease in area was due to the "Grow More Food Crops" campaign.

Baroda District.—During the year the total cotton area in the district was about 3,05,980 acres. Of this, 37,276 acres were under Vijaya in Sinor and Karjan talukas. The total improved Suyog seed distributed and controlled was 3,81,772 lbs. The area under B.D. 8 was 2,08,344 acres in Baroda-Padra and the rest of the area, viz., 60,360 acres, was under B. 9 in Savli and Waghodia talukas. The improved seed of these two types distrubuted and controlled was 2,65,940 lbs. Vijaya, which is very popular, consists of a mixture of two strains, 1-2 and 1-6, in equal proportion. It is superior to B.D. 8 in respect of ginning percentage by 8 to 9 per cent and also acre yield. Its other economic characters are similar to those of B.D. 8. During 1945-46 its cultivation was made compulsory in the whole of the Baroda District, except in Vejpur area of Savli Taluka. B.D. 8 is a medium long staple cotton, with a staple length of 7/8" and spinning value of 38's H.S.W.C. It is wilt-resistant but its low ginning is its chief defect. In respect of yield, it is superior to the local. B. 9 is a type superior to the local Ghoghari mixture in staple and spinning value. Its ginning percentage is 36 to 37 and staple length 13/16". It is specially suited to Vejpur area of Savli Taluka.

Navsari District.—The total area under 1027 A.L.F. in this district was 1,51,638 acres against 1,65,000 acres last year, and that under Suyog 16,980 acres. The Department has stocked 1,39,970 lbs. of 1027 A.L.F. and 3,36,714 lbs. of Suyog seed for sowing in the next season.

Mehsana District.—The total area in the Mehsana District during the season was 52,209 acres. The areas covered by Wagad 8, Broach 9, Wagotar and Seg. 8-1 were 24,963, 517, 730 and 30 acres, respectively. The seed controlled and distributed by or through the department was 49,000 lbs. of Wagad 8,93,580 lbs. of Wagotar and 360 lbs. of B. 9.

Amreli District.—The total area in the district was some 20,590 acres. The areas under the improved varieties, viz., C. 520 and "Pratap" were 3,000 and 70 acres, respectively, and the seed distributed was 50,000 lbs. of C. 520 and 1,520 lbs. of "Pratap." The latter which is a selection from Mathio, is the only new type. It has a good staple and fetches Rs. 70/- 'on' as compared with Jarila.

RAJPIPLA STATE

The Rajpipla Cotton Improvement Act, which was passed in 1921, prohibits the import or sowing of *Ghoghari* or any other short staple cotton in the State. The export, likewise, of cotton by rail or by boat is entirely prohibited except in the form of full-pressed bales, an exception being made only in favour of *bona-fide kheduts* who are allowed to take their cotton in carts for sale outside the State. Best cotton seed of the 1027 A.L.F. variety is supplied by the State to the *kheduts* and only the long staple cotton of this strain is grown throughout the State. The cotton grown in the State has attained a high standard of reputation on account of its purity and it finds a ready market. During the year under report the best seed was obtained through the good offices of the Commissioner of Agriculture, Baroda State, and supplied as usual by the State authorities to the cultivators. The total area under cotton cultivation throughout the State during the year was about 1,01,861 acres; the total outturn was 22,943 bales pressed within the State and about 1,449 bales pressed outside the State limits from the cotton transported by some cultivators of the outlying parts for sale outside the State. The reduction in the outturn of cotton crop was mainly due to the "Grow More Food Campaign" rigorously followed in the State.

MYSORE STATE

The total area under cotton in the Mysore State during the year 1944-45 was 1,00,000 acres. Three improved varieties of cotton, 2 American (Co. 4 and M.A.V.) and one Asiatic (Selection 69) were under distribution. Particulars regarding these are given below:—

Particulars.	Co. 4 (Cambodia strain.)	M.A.V. (Mysore-American.)	Selection 69 (Kumpta variety.)
1. Acreage covered ..	4,000 acres.	800 acres.	10,000 acres.
2. Districts in which distributed.	Mandya, Hassan, Chitaldrug and Shimoga.	Mandya, Hassan, Chitaldrug and Shimoga.	Chitaldrug district.
3. Quantity of seed controlled and distributed by the Department.	2,000 mds.	400 mds.	3,000 mds.
4. Acre yield	500 to 700 lbs. kapas.	Slightly higher than Co. 4.	200 to 250 lbs. kapas.
5. Staple length ..	1"	1-1/8"	7/8"
6. Ginning outturn ..	35%	35%	29%

GWALIOR

STATEMENT SHOWING AREA UNDER COTTON IN GWALIOR STATE DURING THE YEAR 1944-45.

Total area under cotton in Gwalior State.	Area under improved types.		Quantity of seed of each improved variety controlled and distributed by the Department		Remarks.
	Varieties.	Area in acres.	Varieties.	Quantity of seed in lbs.	
4,70,502 (Including Jagirs)	G. 16—A Malvi strain	10,542.1	G. 16	1,74,672	
	Cambodia ..	4,935.5	Cambodia ..	37,872	
	Jarila ..	1,700.0	Jarila	16,636	
	Upland	1,757.8	Upland	27,090	
	Total ..	18,935.4	Total ..	2,56,270	

CHAPTER VII

COTTON MARKETING, LEGISLATION AND OTHER PROTECTIVE MEASURES

(i) Increased use of Indian cotton in mills in India.—The question of the possibility of increasing the use of Indian cotton in mills in India received considerable attention during the year. In this connection, it was observed that the consumption of Indian cotton in mills in India had decreased from 4,306,831 bales of 400 lbs. net in 1942-43 to 4,119,461 bales in 1943-44, whilst that of foreign cotton had increased from 464,522 bales (455,232 bales of 400 lbs. net) in 1942-43 to 633,671 bales (620,998 bales of 400 lbs. net) in 1943-44. It was thought that one of the factors contributing to increased consumption of foreign cotton might be the premium which mills received for cloth manufactured from such cotton and the abolition of this premium was, therefore, suggested. The view was, however, expressed that foreign cotton was being imported into India mainly because of the demand by consumers in the country for finer qualities of cloth to meet which the supply of suitable Indian cotton to the extent required was quite inadequate. It was further pointed out that, in pursuance of a previous recommendation made by the Committee, cloth manufactured from combed Indian cotton was being treated on the same footing as cloth manufactured from foreign cotton for the purposes of the premium. It was accordingly decided that no action should be taken in the matter but that the position should be reviewed from time to time. The figures for the year ending 31st August, 1945, indicate that the consumption of Indian cotton increased by 39,146 bales over the 1943-44 season. The consumption of foreign cotton during the 1944-45 season amounted to 6,30,358 bales of 400 lbs. net, being only 9,360 bales higher than the 1943-44 figure.

(ii) Inclusion of Indian cotton in the proposed post-war Universal Contract.—The Committee supported the East India Cotton Association's representation to the Liverpool Cotton Association against the reported exclusion of Indian cotton from the basis of the proposed post-war Universal Contract in Liverpool. The view was expressed that it would be a great injustice if Indian cotton

of basic staple length were omitted from the Contract, particularly as legislative action was proposed to be taken to prevent "mixing" which appeared to be the main ground for exclusion of East Indian cottons from the Contract. The Government of India were accordingly requested to take up the matter with the Liverpool Cotton Association with a view to securing the inclusion of saw-ginned East Indian cotton in the proposed Universal Contract.

(iii) **Cotton baling hoops.**—The arrangements for the distribution of cotton baling hoops were continued along the lines of past year. During the year under report, some 10,474 tons of Lease-Lend hoops and hoops of indigenous manufacture, were distributed to pressing factories in the country through the agency of this office working in conjunction with the Iron and Steel Controller. In addition, permits were issued to enable pressing factories to obtain some 800 tons of secondhand hoops from mills and stockists in the country. On the recommendation of the Baling Hoops Advisory Committee, the maximum rate for pressing cotton during the 1944-45 season was fixed by the Government of India at Rs. 10/- per bale, the same as in the last season. Except in the case of one factory at Bezwada, Madras Province, no application for permission to charge a higher pressing rate was granted.

The Punjab Government intimated that the maximum charge of Rs. 10/- for pressing a bale of cotton fixed by the Government of India was somewhat high as enquiries made by them of pressing factories in the Province in the 1943-44 season had shown that the pressing costs in that season varied from Rs. 6-11-0 to Rs. 8-7-6 per bale and ginning costs from Rs. 10-3-0 to Rs. 13-5-0. In the opinion of the Provincial Government the maximum charge for pressing should be Rs. 8/- per bale and the total charges for ginning and pressing Rs. 20/- per bale; this would allow a profit of more than one rupee per bale. In regard to the maximum pressing rate, the Provincial Government were informed that the rate of Rs. 10/- per bale had been recommended by the Baling Hoops Advisory Committee on an all-India basis, and that it was within the competence of the Provincial Government to fix a maximum rate lower than Rs. 10/- per bale in any particular area within the Province, should they consider this to be warranted in the light of the prevailing rates for labour, etc. It was emphasised, however, that unless the Punjab

Government prescribed separate maximum rates for ginning and pressing, the fixing of a lower maximum rate for pressing only would be ineffectual as the factories would take advantage of the absence of a maximum ginning rate and charge a higher combined rate.

From the 1st April, 1945, sub-licences were issued by the Committee's office to individual factories to enable them to acquire their allotments of hoops. This arrangement has replaced the procedure under which Written Orders were issued by the Deputy Iron and Steel Controller, Bombay, on the recommendation of this office.

(iv) Reversion to pre-war lashings of cotton bales.—The question of reversion to pre-war lashings of cotton bales was considered by the Committee at one of its meetings and after a lengthy discussion, it was felt that the disadvantages resulting from reduction in the number of lashings far outweighed the saving in money affected. Since the Karachi Chamber of Commerce, the Karachi Cotton Association and the Sind Cotton Ginners' Association were also in favour of reverting to the pre-war number of lashings, and as the investigations conducted at the Committee's Technological Laboratory some years ago had shown that the degree of density within the range experimented had no deleterious effect on the cotton fibre, it was decided to advise the factories to revert to the pre-war number of 12 lashings both in the interests of the reputation of Indian cotton bales and in order to prevent waste of shipping space and loss resulting from bursting of bales due to inadequate lashings. The desirability of covering the bales properly with hessian cloth of standard quality was also stressed to the factories.

(v) Fuel requirements of ginning and pressing factories.—The arrangements for the supply of coal, under priority, to cotton ginning and pressing factories on the recommendation of this office working in conjunction with the Textile Commissioner, Bombay, were continued during the season under report. The total quantity of coal recommended by this office for supply to ginning and pressing factories during the year amounted to about 137,000 tons. Recommendations were also made for the supply of diesel oil to cotton ginning and pressing factories. In addition, assistance was given to the factories in the matter of obtaining iron and steel required for maintenance and repairs.

(vi) Dismantling of cotton ginning and pressing factories.—Applications under the Factories (Control of Dismantling) Ordinance, 1943, for the grant of permission for the dismantling of cotton ginning and pressing factories are referred to this office for opinion by the Textile Commissioner, Bombay. Several such applications were dealt with during the year under review.

(vii) Fixation of separate floor and ceiling prices for Co. 3 and Co. 4 cottons.—The Madras Government represented that as Co. 3 and Co. 4 cottons were of comparatively recent introduction, trading in them had not yet become normal and that, therefore, in actual practice they did not fetch to the grower the price they should as compared with Co. 2. In order, therefore, to give Co. 3 and Co. 4 a fair start, the Provincial Government suggested the fixation of separate floor and ceiling prices for them. During discussion at the Committee, it was stated that the main reason for Co. 3 and Co. 4 strains not obtaining a better price was mixing. The consensus of opinion was that there was a great demand for cottons of this type and that, if offered pure, there was no reason why they should not fetch a price commensurate with their intrinsic merit. The Committee had, however, no objection to recommending a ceiling price of Rs. 725/- for average qualities of Co. 3 and Co. 4 cottons. The Madras Government subsequently proposed that the ceiling price of Co. 3 and Co. 4 cottons should be fixed at Rs. 750/- per candy and the floor price at Rs. 600/- per candy, and further requested that the cloth manufactured out of these cottons should be treated on the same footing as African cotton in respect of the premium paid for cloth manufactured from foreign cottons. The Government of India who were addressed in the matter intimated that if a special ceiling and floor price were to be fixed for these cottons, the ceiling would be Rs. 750/- and the floor about Rs. 550/- per candy. The Committee was, however, of the opinion that the difference between the ceiling and floor price should be maintained on the basis of Jarila and it accordingly recommended that the floor for Co. 3 and Co. 4 cottons should be fixed at Rs. 570/- per candy. As regards the point raised by the Madras Government about the question of treating Co. 3 and Co. 4 cottons on the same footing as African cotton for purposes of premium paid for cloth manufactured from foreign cottons, it was understood from the Textile Commissioner

that there was no longer any specific premium given for cloth manufactured from foreign cottons which, following the protest of the Indian Central Cotton Committee, had been abandoned.

(viii) Supply of iron for agricultural purposes.—In connection with the supply of iron for agricultural purposes, at controlled rates, the Madras Government intimated *inter alia* that the quota allotted for period III of 1945 (2812.9 tons) was very small compared with the quotas for the previous periods and that up to 31st May, 1945, a quantity of 2,687.07 tons only had been supplied against a total allotment of 15,647.82 tons from period III of 1944 to period III of 1945. This was stated to be quite inadequate to meet the heavy demand and the reason for it was waggon shortage. Enquiry was made of the Director of Agriculture, Bombay, as to whether the quota of iron allocated by Government for agricultirists in the Province of Bombay was considered to be adequate for their requirements. The Director of Agriculture, Bombay, replied that out of the estimated requirements of 5,000 tons of iron per quarter for agricultural purposes the Iron and Steel Controller, Calcutta, invariably reduced the quota by anything up to 55 per cent and that even the reduced quota was never received in time being sometimes a whole quarter behind the due delivery date. As regards the Central Provinces and Berar, the Provincial Government intimated in June 1945 that the position had improved compared to what it was in July 1944, when the matter was considered by the Indian Central Cotton Committee, but that this did not mean that all the requirements of iron and steel were being satisfied. The matter was reviewed by the Committee which expressed the view that the position was far from satisfactory and that the attention of the Government of India should be drawn to this. Action was taken accordingly and in reply it was stated that owing to war demands which continued on the same level in 1945 as in earlier years, and transport difficulties adequate quantity of steel could not be made available to meet civil needs. The Government of India have since intimated that with the cessation of hostilities and the reduction in war demands, sufficient tonnage is likely to be available during 1946.

(ix) Regulated Cotton Markets.—Investigation into the financing and marketing of cultivators' cotton having established beyond doubt that cultivators obtain better prices for their cotton in tracts

where regulated markets exist, Provincial Governments were requested by the Committee to establish such markets in all the more important cotton growing areas. Accordingly, legislation for the establishment of regulated markets has been enacted in the Provinces of Bombay, Madras, the Punjab and the Central Provinces, and the Hyderabad, Baroda, Indore and Sangli States. In the Province of Bombay, the Agricultural Produce Markets Act has been made applicable during the year to the cotton markets at Bagalkot, Pachora and Chalisgaon, including these there are now 15 such markets in the Province. It is proposed to apply the Act to Barsi Pandharpur, Nandurbar and Nargund cotton markets in due course. In the Punjab, under the Agricultural Produce Markets Act, 1939, 133 market areas have been notified and Market Committees constituted. These Committees have functioned satisfactorily and it is reported that the Act has in a number of places already found to be of considerable advantage to the growers. In Mardas three regulated markets continued to function at Tirupur, Adoni and Nandyal. In the Hyderabad State, the Hyderabad Agricultural Produce Markets Act has been made applicable to 28 markets and in the light of the experience gained the question of revising the legislation is under consideration of the State Government.

(x) Agmarking.—During the year, Agmarking of cotton bales continued at Hubli, Gadag, Bailhongal and Savanur as a guarantee of purity of cotton by affixing Agmark labels to bales after supervision of ginning and pressing by the special staff. Agmarking has been made applicable to V. 434, Sind-Sudhar and Perso-American cottons.

(xi) Universal Standards.—As mentioned in the previous reports, since 1934, with the co-operation of the East India Cotton Association, and the Karachi Cotton Association, Universal Standards common to both the markets have been prepared by a Special Sub-Committee of the Indian Central Cotton Committee. As already reported, on the suggestion of the two Associations, the preparation of Universal Standards was dropped for the period of the war.

(xii) Legislation to maintain the purity of cotton and other protective measures.—In order to check the spread of undesirable or inferior types of cotton and insect pests and diseases and other

malpractices, several legislative measures have been passed by the Central and Provincial Governments on the recommendation of the Indian Central Cotton Committee. A brief account of the working of these measures during the year under review is given below. For more details, previous reports should be referred to.

(a) **Cotton Transport Act.**—During the year, two notifications were issued by the Government of Bombay under the Cotton Transport Act in connection with (1) the amalgamation of the Olpad Surat cotton areas and (2) the inclusion of 72 villages of Badami taluka of Bijapur district in the Kumpta-Dharwar area. The question of application of the Cotton Transport Act to the Khandesh tract is under the consideration of the Bombay Government. As a result of representations made by growers and the trade regarding the indiscriminate mixing of the different varieties of cotton produced in the Southerns area, the Government of Madras on the recommendation of the Provincial Cotton Committee ordered the bifurcation of the Southerns area into two protected areas, viz., Cambodia area and Tinnevelly area.

(b) **Cotton Ginning and Pressing Factories Act.**—In pursuance of the recommendation of the Committee regarding prohibition of the mixing of cotton, the Director of Agriculture, United Provinces, forwarded for the consideration of the Committee a draft bill to amend the Cotton Ginning and Pressing Factories Act, in its application to that Province, with a view to preventing watering, mixing and adulteration of cotton. The draft bill was approved with certain amendments to bring it in line with similar legislation already in force in the Bombay Province.

It was reported last year that the Central Provinces Government were requested to amend Section 3A of the Cotton Ginning and Pressing Factories Act, 1925, in its application to that Province, so as to close certain loop holes in the Act. The Central Provinces Government accordingly forwarded for the consideration of the Committee an amended draft but as the Committee felt that the proposed amendment did not provide for action to be taken against offences discovered after the bales had passed out of the factory and also did not include provisions to close the loop holes in the existing Act regarding the mixing of cotton waste with cotton and deliberate watering of cotton, it decided that the Central Provinces Govern-

ment should again be addressed in the matter and requested to give effect to the amendment of Section 3A of the Act, on the lines already suggested by the Committee.

In view of the fluctuating conditions of the market with regard to gin and press stores, the Central Provinces Government decided that ordinarily no meetings of the Rate Fixing Committees should be held during the season 1944-45. The Central Provinces and Berar Cotton Ginning and Pressing Factories (Amendment Act) 1939, which dealt with the control of rates charged for ginning and pressing cotton automatically ceased to operate from June 1945, as no fresh notification extending its life was issued by the Provincial Government.

In the Punjab, seven prosecutions were instituted, four under Section 9(3), two under Sections 3(5) (a) and 3(6) and one under Section 3(6) of the Cotton Ginning and Pressing Factories Act, 1925, Out of these in two cases, viz., one under Section 9(3) and another under Sections 3(5) and 3(6), the accused were convicted and fined Rs. 10/- and Rs. 25/-, respectively.

By Notification No. 394 dated the 28th May, 1945, issued by the Government of Madras, Development Department, under Section 5A of the Cotton Ginning and Pressing Factories Act, 1925, as amended by Act IX of 1942, the provisions of Section 5A of the Act relating to submission of returns by ginning factories were brought into force in the Province with effect from the 1st February, 1946.

Out of 67 Indian States which have enforced in their territories the main provisions of the Cotton Ginning and Pressing Factories Act as applied to British India, by legislation or executive orders, weekly returns of cotton pressed were received from 52 States; in the remaining States, pressing factories did not work during the year.

(c) **Prevention of Introduction of Foreign Cotton Pests.**— In order to prevent the introduction into India of the Mexican Boll-weevil (Anothonomus grandis) with imported American cotton, at the instance of the Committee, regulations have been imposed by the Government of India under which the import of American cotton into India is prohibited except through the port of Bombay where it must be fumigated with hydrocyanic acid gas before entry into the country. The work of fumigation is carried out under the

technical supervision of the Secretary, and the cost involved is met by the levy of a small fee from importers on each bale of American cotton fumigated. Owing to the restrictions necessitated by the war, the imports of American cotton during the year under review amounted to only 8,694 bales.

(d) **The Red (Sudan) Bollworm (Diperopsis castanea) and other pests.**—The restriction in the import of foreign *kapas* (unginned cotton) and of foreign cotton seed remained in force throughout the year.

(e) **Cotton Control Act.**—Cotton Control Acts are in operation in the Provinces of Madras, Bombay, and the Central Provinces and in the Baroda and Bhopal States. The aims and objects of the Acts in the areas where they are in force are stated in previous reports.

In Bombay Province, under Government Notification No. 3939/33/6581-J, dated the 1st April, 1944, only the Jarila variety of cotton is permitted to be grown in the East Khandesh District, and the cultivation of any other variety of cotton in that district is prohibited. Further, in the East Khandesh district, under Government Notification No. 3939-33-J, dated the 1st November, 1944, the mixing of any other variety of cotton with the Jarila variety and the possession, use or trade in any other variety of cotton whether mixed or not with the Jarila variety are prohibited. Similarly, the Cotton Control Act was applied to the West Khandesh District, excluding Nawapur Peta, Nandurbar and Taloda talukas and to the talukas of Baglan, Kalwan, Malegaon, Nandgaon and Yeola of Nasik District (vide Government of Bombay Notifications No. 3939/33-6581-J, dated the 29th March, 1944, and No. 3939/33-6581-J, dated the 1st November, 1944). The Act was applied to the Kumpta-Dharwar Protected Area, consisting of Dharwar and Belgaum districts and Tasgaon and Walva talukas of Satara districts, from the 1st July, 1944. All the Southern Maratha Country States included in the Kumpta-Dharwar area simultaneously applied the Act in their respective territories.

In the Central Provinces, propaganda was carried on against the cultivation of and trade in Garrowhill cotton which, as a result, has practically disappeared from the cotton tract of the Province.

D. N. MAHTA,
Secretary.

APPENDIX I

MEMBERS OF THE INDIAN CENTRAL COTTON COMMITTEE.

(1) PRESIDENT—
Mr. H. R. Stewart, C.I.E., I.A.S., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*.
The Agricultural Commissioner with the Government of India, *ex-officio*.

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS—

Madras	Rao Bahadur Dr. B. Viswanath, C.I.E., F.I.C., Director of Agriculture.
Bombay	Sir William Jenkins, C.I.E., I.A.S., Director of Agriculture.
United Provinces	Mr. C. Maya Das, I.A.S., Director of Agriculture.
Punjab	Malik Sultan Ali Noon, I.A.S., Director of Agriculture.
Central Provinces and Berar	Mr. R. H. Hill, I.A.S., Director of Agriculture.
Sind	Rai Bahadur R. L. Sethi, Director of Agriculture.

(3) THE DIRECTOR OF COMMERCIAL INTELLIGENCE, *ex-officio*.

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS—

The East India Cotton Association	Sir Purshotamdas Thakurdas, K.B.E., C.I.E.
The Bombay Millowners' Association	Sir Sorab Saklatvala, M.L.A.
The Bombay Chamber of Commerce	Mr. L. F. H. Goodwin.
The Indian Merchants' Chamber ..	Sir Chunilal B. Mehta. (*Vice-President.*)
The Karachi Chamber of Commerce	Mr. A. P. Darlow.
The Ahmedabad Millowners' Association.	Mr. Ramanlal Lallubhai.
The Tuticorin Chamber of Commerce	Mr. J. L. Hurschler.
The Upper India Chamber of Commerce	Major S. R. Pocock, M.C., M.B.E. M.L.A.
The Empire Cotton Growing Corporation	Sir William Roberts, C.I.E.

(5) COMMERCIAL REPRESENTATIVES NOMINATED BY CENTRAL GOVERNMENT—

Central Provinces and Berar	Mr. Baburao Krishnaji Patil, Seth Gopaldas Mohta.
Madras	Mr. J. R. Marshall.
Punjab	Sardar Bahadur Sardar Ujjal Singh, M.L.A.

(6) BENGAL REPRESENTATIVE .. .. Mr. Surya Kumar Basu.

(7) CO-OPERATIVE BANKING REPRESENTATIVE—Sir Chunilal V. Mehta, K.C.S.I.

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

Madras	Mr. K. V. Odhumalai Gounder. Mr. L. Madhava Reddi.
Bombay	Rao Bahadur F. B. Loxmeshwar. Mr. B. K. Patel.
United Provinces	Major Nawab Mohd. Jamshed Ali Khan, M.B.E., M.L.A. Rai Bahadur Kunwar Laxmi Raj Singh, M.L.C.

Punjab	Chaudhri Ram Sarup, M.L.A. Mian Mohammad Nurulla.
Central Provinces and Berar	Rao Bahadur Sir Madhaorao G. Deshpande, K.B.E., Mir Riyat Ali.
Sind	Mr. Fakirjee Perozshaw Golwalla, J.P.

(9) AND (10) REPRESENTATIVES OF INDIAN STATES.—

Hyderabad State	Rai Saheb Kalidas Sawhney, Director of Agriculture (Research).
Baroda State	Sir Robert Allan, C.I.E., Commissioner of Agriculture.
Gwalior State	Mr. N. M. Deshmukh, Director of Agriculture.
Rajputana and Central India States	Rao Bahadur V. A. Tamhane.

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN COUNCIL :—

1. Rao Bahadur S. S. Salimath, Headquarters Deputy Director of Agriculture, Poona.
2. Mr. M. J. Narasimhan, Director of Agriculture in Mysore, Bangalore.
3. Rao Bahadur V. Ramanatha Ayyar Avl., Headquarters Deputy Director of Agriculture, Madras.
4. Musahib-i-khas Bahadur Capt. H. C. Dhanda, Commerce Minister, Holkar State, Representative of the Holkar State.
5. Representative of the Karachi Indian Merchants' Association—Vacant.
6. Dr. B. L. Sethi, Deputy Director of Agriculture, Western Circle, Aligarh.
7. Sardar Bahadur Sardar Beant Singh.
8. Mr. Roger Thomas.
9. Sir Shri Ram, Representative of the Cotton Millowners of Delhi.
10. Representative of the Karachi Cotton Association Ltd.—Vacant.
11. Dewan Bahadur Sir T. Vijayaraghavacharya, K.B.E.
12. Dr. P. J. Gregory, Second Economic Botanist, Bengal.
13. Dr. V. K. R. V. Rao, Director of Statistics, Food Department, Government of India.
14. Mr. Camar Tyabjee, Managing Agent, Osman Shahi and Azamjahi Mills, Hyderabad (Deccan).
15. Sir Padampat Singhania, Senior Proprietor, Messrs. Juggilal Kamlapat, Cawnpore.
16. Mr. R. G. Saraiya, O.B.E., Messrs. Narandas Rajaram & Co., Bombay.
17. Mr. G. V. Deshmukh.

APPENDIX II

SUB-COMMITTEES.

Standing Finance Sub-Committee.—Sir Chunilal B. Mehta (Vice-President), Chairman; Mr. H. R. Stewart (President); (*ex-officio*); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Sir Chunilal V. Mehta; Mr. J. L. Hurschler; Sir William Jenkins; Rao Bahadur Sir Madhaorao Deshpande and Mr. R. G. Saraiya.

Local Sub-Committee.—President (Mr. H. R. Stewart); the Vice-President (Sir Chunilal B. Mehta); Sir Purshotamdas Thakurdas; Sir Sorab Saklatvala; Sir Chunilal V. Mehta. Mr. J. L. Hurschler;, Mr. L. F. H. Goodwin; Mr. R. G. Saraiya; Sir William John Jenkins; Mr. A. P. Darlow; Rao Bahadur Sir Madhaorao Deshpande and Rao Bahadur F. B. Loxmeshwar.

Agricultural Research Sub-Committee.—

I. *The President*—Mr. H. R. Stewart (*ex-officio*).,

II. *The Vice-President*—Sir Chunilal B. Mehta (*ex-officio*),

III. *The Co-operative Banking Representative*—Sir Chunilal V. Mehta (*ex-officio*),

IV. *Cotton Growers' Representatives*—Sir William Roberts, Mr. Fakirjee Perozshaw Golwalla, Rao Bahadur Sir Madhaorao Deshpande, Mir Riyat Ali,

V. *Cotton Trade Representatives*—Sir Purshotamdas Thakurdas, Mr. R. G. Saraiya, Mr. J. L. Hurschler, Mr. L. F. H. Goodwin, Seth Gopaldas Mohta.

VI. *Agricultural Officers*—The Agricultural Commissioner with the Government of India (*ex-officio*), Sir William John Jenkins, Malik Sultan Ali Noon, Mr. C. Maya Das, Rao Bahadur Dr. B. Viswanath, Sir Robert Allan, Rai Saheb Kalidas Sawhney, Mr. N. M. Deshmukh, Mr. R. H. Hill, Rai Bahadur R. L. Sethi, Mr. M. J. Narasimhan, Rao Bahadur S. S. Salimath, Rao Bahadur V. A. Tamhane.

VII. *Additional Members*—Dewan Bahadur Sir T. Vijayaraghavacharya, Mr. Mohammad Afzal, Mr. K. Ramiah, Professor R. H. Dastur, Rao Bahadur V. Ramanatha Ayyar, Dr. B. L. Sethi, Dr. R. Sankaran, Mr. S. S. Pande, Dr. V. G. Panse, Dr. B. N. Uppal, Dr. P. J. Gregory, Dr. S. D. Choudhry, Dr. Nazir Ahmad, Mr. P. D. Gadkari, Mr. L. Madhava Reddi, Mr. R. Balasubramanian, Mr. Roger Thomas, Dr. Khan A. Rahman.

VIII. The Secretary.

Technological Research Sub-Committee.—The President—Mr. H. R. Stewart(*ex-officio*), The Vice-President—Sir Chunilal B. Mehta (*ex-officio*), The Agricultural Commissioner with the Government of India (*ex-officio*), Sir Purshotamdas Thakurdas, Dewan Bahadur Sir T. Vijayaraghavacharya, Sir Sorab Saklatvala, Sir Chunilal V. Mehta, Sir William Roberts, Sir Shri Ram, Sir Padampat Singhania, Sir William John Jenkins, Mr. R. H. Hill, Mr. L. F. H. Goodwin, Major S. R. Pocock, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Mr. B. K. Patil, Rao Bahadur Dr. B. Viswanath, Malik Sultan Ali Noon, Dr. Nazir Ahmad, Rao Bahadur V. Ramanatha Ayyar, Rai Bahadur Kalidas Sawhney, Seth Gopaldas Mohta, Mr. K. Ramiah, Mr. Roger Thomas, Dr. R. Sankaran, Dr. B. L. Sethi, Mr. Mohammad Afzal, Dr. K. Venkataraman, Mr. P. D. Gadkari, Mir Riyat Ali, the Director of Industries, Bombay, The Principal, Victoria Jubilee Technical Institute, Bombay, Mr. J. C. Lancashire and Mr. H. G. H. Everitt (Representing the Bombay Millowners' Association), Mr. Ambalal Himatlal and Mr. Pranlal Bhikabhai (Representing the Ahmedabad Millowners' Association) and Mr. Gatulal Rangildas and Mr. Jamnadas Ramdas (Representing the East India Cotton Association, Ltd.)

Cotton Forecast Sub-Committee—The President (*ex-officio*), The Vice-President, the Agricultural Commissioner with the Government of India (*ex-officio*), The Director of Commercial Intelligence, the Director of Agriculture, Bombay Province, the Director of

Agriculture, Punjab, the Director of Agriculture, Madras, The Director of Agriculture, United Provinces, the Director of Agriculture, Central Provinces and Berar, the Director of Agriculture, Sind, the Director of Agriculture (Research), H.E. H. the Nizam's Government, the Commissioner of Agriculture, Baroda, the Director of Statistics, H. E. H. the Nizam's Government, the Director of Land Records, Central Provinces and Berar, the Director of Statistics, Calcutta, the Statistical Officer, Department of Industries and Commerce, Madras, Dr. V. K. R. V. Rao, Mr. J. L. Hurschler, Mr. L. F. H. Goodwin, Sir William Roberts, Sir Chunilal V. Mehta, Mr. Roger Thomas and Dr. V. G. Panse.

Cotton Ginning and Pressing Factories Sub-Committee—The President—Mr. H.R. Stewart, the Vice-President—Sir Chunilal B. Mehta (*ex-officio*), the Co-operative Banking Representative—Sir Chunilal V. Mehta (*ex-officio*), Sir Purshotamdas Thakurdas, Sir Sorab Saklatvala, Mr. J. L. Hurschler, Mr. R. G. Saraiya, Sir William Roberts, Sir William J. Jenkins, Mr. B. K. Patil, Major S. R. Pocock, Mr. L. F. H. Goodwin, Mr. J. R. Marshall, Mr. R. H. Hill and Dr. Nazir Ahmad.

Standards Sub-Committee.—This Sub-Committee was not constituted as the preparation of Universal Standards has been held in abeyance for the duration of the war.

APPENDIX III

Statement of Receipts and Payments for the Year ended 31st March, 1945.

RECEIPTS.	Rs. a. p.	Rs. a. p.	Rs. a. p.	PAYMENTS.	Rs. a. p.	Rs. a. p.
Opening Balance as on 1st April 1944	8,50,605 2 5			*Administration of the Committee*— (Including Improvement of Cotton Marketing, Printing, Publicity, and Distribution and Travelling Allowance of Non-Official Members, less Rs. 14,619-13-0 transferred to Hoops and Fuel Account)		1,54,341 8 3
Sinking Fund	19,132 9 0					
		8,69,737 11 5				
Less—Adjustment of Suspense Receipts during 1943-44 ...		745 2 3				
			8,68,992 9 2	*Agricultural Research Grants-in-aid*— (Including Research, Seed, Marketing and Miscellaneous Schemes)		5,51,736 4 8
Receipts under Section 12 of the Indian Cotton Cess Act, 1923			4,71,950 12 4	*Technological Research*		2,35,232 14 4
Other Receipts— Sale of publications, sale of Cotton, Miscellaneous Receipts, Test Fees, etc. ...	19,393 0 9			*Closing Balance*— (Government Paper at Cost). 2½ per cent. Government of India Loan 1948-52 of the Face Value of Rs. 4,00,000	3,99,062 8 0	
Suspense Receipts	1,089 4 9			3½ per cent. Government Promissory Notes of the Face Value of Rs. 1,00,000	99,750 0 0	
Sinking Fund Provision 1944-45	1,712 0 0			3½ per cent. Government of India Loan 1947-50 of the Face Value of Rs. 3,50,000	2,89,782 13 0	
		22,194 5 6		4½ per cent. Government of India Loan 1955-60 of the Face Value of Rs. 26,600	25,004 0 0	
Interest on Investments ...		40,607 10 1		6 per cent. Bombay Municipal Debentures 1954 of the Face Value of Rs. 10,000	3,950 0 0	
			62,801 15 7	6 per cent. Rangoon Municipal Debentures of the Face Value of Rs. 3,83,500	4,15,328 2 0	
Amount received from the Cotton Fund at the disposal of the Government of India		8,66,511 0 0			12,32,877 7 0	
Less—Refunds		36,366 0 0				
			8,30,145 0 0			
Net Profit realised on sale of Securities			12,663 12 0			
				(Market value as on 31st March 1945 Rs. 13,21,797-14-0, inclusive of Rangoon Municipal Debentures at cost). 3½ per cent. Government of India Loan 1947-50 of the Face Value of Rs. 1,50,000 have been deposited with the Imperial Bank of India, Bombay, as Security against any Overdraft that may be required by the Committee.		
Carried over ...			22,46,554 1 1	Carried over ...		9,41,330 11 3

Statements of Receipts and Payments for the Year ended 31st March, 1945.—(*contd*).

RECEIPTS.				PAYMENTS.			
	Rs. a. p.	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.	Rs. a. p.
Brought forward ...			22,46,554 1 1	Brought forward ...		12,32,877 7 0	9,41,330 11 3
				Current Account with the Imperial Bank of India, Bombay		43,079 15 8	
					Rs.		
				Imprests :—			
				(1) Secretary's Office	1,579		
				(2) Director, Technological Laboratory, Matunga	500		
				(3) Director of Agriculture, Bombay ...	1,820		
				(4) Director of Agriculture, Sind	725		
				(5) Cotton Research Botanist, Lyallpur...	150		
				(6) Plant Physiologist, Indore	400		
				(7) Geneticist and Botanist, Indore ...	300		
						5,474 0 0	
				Suspense—(Recoverable)			
				(1) Committee's Account	3,361 8 2		
				(2) Hoops & Fuel Account.			
				Expenditure incurred ... 31,987 9 0			
				Less—			
				Receipts 11,557 2 0			
					20,430 7 0		
						23,791 15 2	
				*Total Closing Balance			13,05,223 5 10
Total Rupees ...			22,46,554 1 1	Total Rupees ...			22,46,554 1 1

*Includes Rs. 20,844-9-0 on account of Sinking Fund.

We have examined the above Statement of Receipts and Payments of Indian Central Cotton Committee with the Books, Vouchers and Certified Returns of the Committee, have obtained all the information and explanations we have required and certify that to the best of our information and explanations received, the above Statement is a correct abstract of the figures appearing in the Books and is drawn up in conformity with the Rules under the Indian Cotton Cess Act, 1923.

BOMBAY, 25*th June*, 1945.

(Signed) S. B. BILLIMORIA & CO.,
Registered Accountants, Auditors.

Provident Fund Account as at 31st March, 1945

RECEIPTS.						EXPENDITURE.			
	Rs.	a.	p.	Rs.	a. p.		Rs.	a. p.	Rs. a. p.
Opening Balance as on 1st April, 1944				6,73,240	0 4	*Balance.*— (Government Securities at Market Value).			
Subscribers' Contributions ...	29,271	10	0			2¾ per cent. Government of India Loan, 1948-52 of the Face Value of Rs. 70,000	69,868	12 0	
Add—Excess recoveries ...	5	4	0			3 per cent. Government of India Defence Bonds 1946, of the Face Value of Rs. 28,000	28,682	8 0	
	29,276	14	0			3 per cent. Government of India Loan 1949-52 of the Face Value of Rs. 35,000	35,546	14 0	
Add—Recoveries against Advances	13,943	4	0	43,220	2 0	3 per cent. Government of India Loan 1951-54 of the Face Value of Rs. 32,000	32,280	0 0	
				7,16,460	2 4	3½ per cent. Government Promissory Notes of the Face Value of Rs. 3,68,500	3,66,887	13 0	
Less—Refunds to subscribers who have resigned	29,021	1	3			3½ per cent. Government of India Loan 1947-50 of the Face Value of Rs. 1,20,000	1,24,275	0 0	
Advances to Subscribers ...	14,148	3	0	43,169	4 3	4 per cent. Government of India Loan 1960-70 of the Face Value of Rs. 12,600	14,206	8 0	
				6,73,290	14 1		6,71,747	7 0	
Committee's Contributions received from Indian Central Cotton Committee				29,271	10 0				
				7,02,562	8 1	Savings Bank Account at the Imperial Bank of India, Bombay	521	12 0	
						Current Account with the Imperial Bank of India, Bombay	32,096	15 11	
Less—Payments made to Subscribers who have resigned, including transfers to "Lapse and Forfeiture Account" for contributions disallowed ...				28,322	11 1				
Carried over ...					6,74,239 13 0	Carried over			7,04,366 2 11

Provident Fund Account as at 31st March, 1945—*contd.*

RECEIPTS	Rs. a. p.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ...			6,74,239 13 0	Brought forward ...		7,04,366 2 11
Interest received on Investments	22,406 6 0					
Interest received on advances to Subscribers	1,072 0 10					
Refund of Income-Tax deducted on Interest received during 1943-44	1,961 12 0					
		25,440 2 10				
Less—Interest paid during the year to Subscribers who have resigned :—						
On their contributions ...	461 7 9					
On Committee's contributions	446 10 6					
Interest paid in advance at the time of purchase of Government Securities (since received)	196 0 0					
Income-tax deducted from Interest on Government Securities	1,818 8 0					
Stationery	34 12 0					
Bank's Commission for collection of interest and stamp charges	26 9 0	2,978 15 3	22,461 3 7			
Investments Fluctuation Account :—						
Appreciation in market value of securities			7,082 13 0			
Lapse and Forfeitures Account			582 5 4			
Total Rupees ...			7,04,366 2 11	Total ...		7,04,366 2 11

Examined and found correct.

(Sd.) S. B. BILLIMORIA & CO.,
Registered Accountants, Auditors.

BOMBAY, *25th June*, 1945

Balance Sheet as on 31st March, 1945

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Cotton Cess Receipts	1,59,68,387 7 8		I. A. Administration	25,99,830 7 9	
Less—Refunds of cess to Burma	42,369 10 9		*Less*—Refunds of expenditure on account of hoops	14,619 3 0	
		1,59,26,017 12 11			25,85,211 4 9
Interest account—			B. *Improvement of Cotton Marketing* :—		
Amount received on investments	23,25,033 15 4		(1) Cost of exhibits, travelling allowance of representatives on the Board of East India Cotton Association and members of Standards Sub-Committee and cost of standards.	2,06,262 6 9	
Add—Refund of income-tax from interest ...	28,806 7 6		(2) Enquiry into cost of cotton production in India	2,71,963 8 9	
	23,53,840 6 10				4,78,225 15 6
Less—			C. Travelling allowance of non-official members ...		2,93,906 13 9
(1) Interest paid in advance at the time of purchasing Government Paper. (Since recovered) interest on temporary overdraft and bank's commission for collection of interest...	71,680 7 6		D. *Printing and Propaganda* :—		
(2) Interest credited to Provident Fund ...	4,886 6 2		(1) Publicity and Propaganda	1,56,555 15 0	
(3) Bank's withdrawal charges	5,811 1 0		(2) Printing and Distribution	1,38,146 2 9	
(4) Income-tax on interest on Government paper	31,200 7 1				2,94,702 1 9
(5) Brokerage for securities sold	828 10 0		E. *Statistical Research*—		
(6) Provision for Sinking Fund	20,844 9 0		(1) Studies of village consumption of Indian cotton	23,913 5 8	
	1,35,251 8 9	22,18,588 14 1	(2) Improvement of cotton Fore-cast ...	30,772 9 0	
			(3) Crop estimating survey on cotton in Central Provinces	51,120 15 9	
					1,05,806 14 5
Carried over ...		1,81,44,606 11 0	Carried over ...		37,57,853 2 2

Balance Sheet as on 31st March, 1946—(*contd.*)

RECEIPTS.						EXPENDITURE.					
	Rs.	a.	p.	Rs.	a. p.		Rs.	a.	p.	Rs.	a. p.
Brought forward ...				1,81,44,606	11 0						
Profit on conversion and sale of securities				3,60,046	8 2	II. Agricultural Research—Grants.				37,57,853	2 2
Sinking Fund account				20,844	9 0	(1) *Research Schemes.*					
Miscellaneous Receipts				1,64,881	12 8						
Refund from Provident Fund for contributions disallowed				3,391	1 11	(i) *Bombay*—					
Receipts from the Cotton Fund	9,63,756	0	0			(1) A. Surat Physiological	2,45,139	11	3		
Less—Amount refunded	36,366	0	0	9,27,390	0 0	B. Surat Physiological Writing-up ...	5,814	7	8		
						(2) A. Surat Bollworm	1,14,509	9	7		
						B. Surat Bollworm Propaganda ...	91,468	9	2		
						C. Surat Bollworm Writing-up ...	2,313	3	0		
						(3) A. Dharwar Wilt	1,82,836	4	11		
Amount received from the Board of Scientific and Industrial Research	4,539	6	0			B. Dharwar Wilt Writing-up ...	10,902	10	3		
Less—Expenditure incurred	3,529	4	0	1,010	2 0	(4) Khandesh	26,573	5	0		
						(5) Co-ordination of Cotton Research ...	1,749	7	6		
Suspense receipts				79	2 9	(6) Jalgaon Cotton Breeding	78,665	2	6		
						(7) Broach Cotton Breeding	1,11,184	2	2		
						(8) Small Leaf Disease Survey	3,038	9	6		
						(9) Survey of Goghari cotton	4,199	5	0		
						(10) Defibraction of cotton seeds	4,878	5	9		
						(11) Plant Puller Propaganda	21,940	1	3		
						(12) Breeding of Wilt Resistant cotton for Surat Area	29,069	6	0		
Carried over				1,96,22,249	15 6	Carried over ...	9,35,184	4	6	37,57,853	2 2

Balance Sheet as on 31st March, 1945—(*contd.*)

RECEIPTS.			EXPENDITURE.		
	Rs. a. p.		Rs. a. p.	Rs. a. p.	
Brought forward ...	1,96,22,249 15 6	Brought forward ...	9,35,184 4 6	37,57,853 2 2	
		(13) Model Projects for improvement of cultivation of crops	2,181 6 0		
		(14) Inclusion of Northerns and Westerns in Dry Farming Research at Bijapur...	6,953 12 7		
		(15) Poona Wilt Breeding	62,289 13 6		
		(16) Improvement of Cotton Crop in Kaira District	8,768 14 6		
		(17) Interspecific Hybridisation at Surat	53,366 4 3		
		(18) Dholleras Wagad Cotton at Viramgam	46,161 15 2		
		(19) Improvement of Dharwar-American cotton	7,645 12 3		
		Total for Bombay ...	11,22,552 2 9		
		(ii) *Madras*—			
		(1) Herbaceum	1,42,466 13 1		
		(2) Pempheres and Physiological ...	2,01,057 10 3		
		(3) Fodder Cholam	19,517 9 4		
		(4) Breeding of Nadam cotton	17,727 2 6		
		(5) Improvement of Mungari cotton	43,620 10 6		
		(6) Investigation of the possibilities for control of cotton stem weevil ...	6,165 7 6		
		(7) Improvement of Coconadas Cotton ...	43,135 11 9		
		Total ...	4,73,691 0 11		
Carried over ...	1,96,22,249 15 6	Carried over ...	15,96,248 3 8	37,57,853 2 2	

Balance Sheet as on 31st March, 1945—(*Contd.*)

RECEIPT			EXPENDITURE		
	Rs. a. p.			Rs. a. p.	Rs. a. p.
Brought forward ...	1,96,22,249 15 6		Brought forward ...	15,96,248 3 8	37,57,853 2 2
		(iii) *Punjab*—			
		(1) Botanical		6,82,136 4 9	
		(2) Entomological		2,25,908 7 11	
		(3) White Fly		48,721 4 1	
		(4) Root Rot		71,048 10 10	
		(5) Spraying Trials		9,977 0 6	
		(6) Defibrating and Delinting		6,112 8 9	
		(7) Survey of Disease of Malformation ...		1,730 10 6	
		(8) Physiological		4,09,587 1 7	
		(9) Clean-up Campaign of Spotted Bollworm		60,025 9 3	
		(10) Jassid investigation		22,239 1 6	
		(11) Improvement of Punjab-American 289F.		20,508 10 3	
			Total ...	15,57,995 5 11	
		(iv) *Central Provinces*—			
		(1) Botanical		4,93,449 9 4	
		(2) Entomological		12,344 13 6	
		(3) Investigation of Heliothis Obsoleta ...		1,672 9 9	
		(4) Central Provinces and Berar Cotton Breeding Scheme		59,481 13 3	
		(5) Model Projects for extension of improvement in cultivation of crops ...		1,851 10 0	
			Total ...	5,68,800 7 10	
			Carried over ...	37,23,039 1 5	
Carried over	1,96,22,249 15 6				37,57,853 2 2

Balance Sheet as on 31st March 1945—(*Contd.*)

RECEIPTS.			EXPENDITURE.		
	Rs. a. p.		Rs. a. p.	Rs. a. p.	
Brought forward ...	1,96,22,240 15 6	Brought forward ...	37,23,039 1 5	37,57,853 2 2	
		(v) *United Provinces*—			
		(1) Pink Bollworm	1,46,616 2 10		
		(2) Rohilkhand and Bundelkhand Survey	18,061 14 4		
		(3) Botanical	93,953 13 0		
		(4) Model Project for extension of improvement in cultivation of crops.	1,835 9 0		
		(5) Scheme for Hybridization of Arboreum cotton	2,816 7 0		
		Total ...	2,63,283 14 2		
		(vi) *Indore*—			
		(1) Institute of Plant Industry	20,16,943 12 0		
		(2) Cotton Genetics Research Scheme ...	1,85,597 4 9		
		(3) Scheme for Cotton Physiological Research	43,947 0 3		
		Total ...	22,46,488 1 0		
		(vii) *Sind*—			
		(1) Physiological	2,63,945 12 10		
		(2) Jassid Investigation	15,471 15 1		
		(3) Black-headed Cricket	9,245 1 3		
		(4) Scheme for investigation for production of long-staple cotton	1,33,736 3 9		
		(5) Bollworm Investigation and Clean-up Scheme	87,304 7 6		
		Total ...	5,09,703 8 5		
Carried over...	1,96,22,240 15 6	Carried over...	67,42,514 9 0	37,57,853 2 2	

Balance Sheet as on 31st March, 1945.—(*Contd.*)

RECEIPTS.			EXPENDITURE.		
	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.
Brought forward ...		1,96,22,249 15 6	Brought forward ...	67,42,514 9 0	37,57,853 2 2
			(*viii*) *Burma*—		
			(1) Capital Expenditure	2,906 15 5	
			(2) Cotton Improvement	47,790 3 9	
			Total ...	50,697 3 2	
			(*ix*) *Hyderabad*—		
			(1) Botanical	4,21,773 13 5	
			(2) Cotton Survey	36,578 3 0	
			(3) Pink and Spotted Bollworm	83,976 10 4	
			(4) Improvement of Kumpta cotton ...	51,783 3 10	
			(5) Inclusion of Northerns and Westerns in Dry Farming Scheme at Raichur...	2,000 4 0	
			(6) Pink and Spotted Bollworm Clean-up Campaign	53,929 2 0	
			(7) Improvement of cottons of the Oomras Tract	41,602 8 7	
			(8) Gaorani Improvement Scheme ...	18,002 4 0	
			Total ...	7,09,646 1 2	
			(*x*) *Bikaner*—		
			Bengals Cotton Improvement	70,377 10 11	
			Carried over ...	75,73,235 8 3	37 57 853 2 2
Carried over ...		1,96,22,249 15 6			

Balance Sheet as on 31st March, 1945.—(*contd*).

RECEIPTS			EXPENDITURE				
	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.		
Brought forward ...		1,96,22,249 15 6	Brought forward ...	75,73,235 8 3	37,57,853 2 2		
			(*xi*) *Baroda*—				
			(1) Root Rot	92,904 15 2			
			(2) Comparative Tests	4,251 5 3			
			(3) Survey of Goghari cotton	3,891 14 7			
			(4) Plant Puller Propaganda	32,533 15 10			
			(5) Mathio cotton at Amreli and Jagudan	35,745 6 11			
			Total ...	1,69,327 9 9			
			(*xii*) *Bengal*—				
			(1) Comilla Scheme	43,919 14 9			
			(2) Cultivation of Long-staple cotton ...	13,712 11 3			
			Total ...	57,632 10 0			
			(*xiii*) *Mysore*—				
			Doddahathi	30,266 1 9			
			(*xiv*) Collection of Iran cotton	3,121 12 0			
			(*xv*) *Baluchistan*—				
			Co-ordination of research on Blackheaded Cricket in Sind and Baluchistan	49,133 1 5			
			(*xvi*) Preliminary Scheme at Nawanagar ...	323 12 4			
			(*xvii*) Estimation of effects on cotton crops of the use of Plant Puller	4,143 12 5	78,87,184 3 11		
Carried over...		1,96,22,249 15 6	Carried over ...		1,16,45,037 6 1		

Balance Sheet as on 31st March, 1945 (*contd.*)

RECEIPT	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ...		1,96,22,249 15 6	Brought forward ...		1,16,45,037 6 1
			(2) *Seed Distribution and Extension Schemes.*		
			(i) *Bombay—*		
			(1) Hubli	44,048 8 3	
			(2) Gadag	41,700 15 1	
			(3) Gadag (Supplementary)	20,167 11 4	
			(4) Surat	93,653 12 4	
			(5) Athani	18,086 1 7	
			(6) Khandesh (Banilla)	1,65,580 4 0	
			(7) Khandesh (Jarila)	1,71,194 12 3	
			(8) Deccan Canals (Banilla)	3,333 3 4	
			(9) B. D. 8	40,662 2 6	
			(10) Revised Jayawant & Gadag No. 1 ...	2,20,733 4 0	
			(11) Maintenance of nucleus of pure seeds of improved varieites of cotton ...	9,664 6 3	
			(12) Scheme for control of Selection 1A	4,965 10 0	
			(13) 1027 A. L. F. cotton in Nawapur Taluka	5,269 1 0	
			(14) Scheme for multiplication of Vijaya Cotton	9,294 2 0	
			(15) Wagotar cotton in Ahmedabad District	5,818 10 0	
			Total ...	8,54,172 7 11	
Carried over ...		1,96,22,249 15 6	Carried over ...	8,54,172 7 11	1,16,45,037 6 1

Balance Sheet as on 31st March, 1945.—(*contd*).

RECEIPTS.						EXPENDITURE.					
	Rs.	a.	p.	Rs.	a.	p.		Rs.	a.	p.	Rs.	a.	p.
Brought forward ...				1,96,22,249	15	6	Brought forward ...	8,54,172	7	11	1,16,45,037	6	1
							(ii) *Madras* :—						
							(1) Pay and allowance of Business Manager, Tirupur	24,079	13	0			
							(2) Co. 2	41,286	2	9			
							(3) H. 1	22,415	4	9			
							(4) Maintenance of nucleus of pure seed of improved varieties of cotton ...	4,504	11	2			
							(5) Co. 8 in Salem District	24,223	3	0			
							Total ...	1,16,509	2	8			
							(iii) *Sind* :—						
							(1) Seed Distribution	4,22,726	10	10			
							(2) Maintenance of nucleus of pure seed of improved varieties of cotton ...	9,862	13	5			
							(3) Financing of seed distribution ...	1,05,283	15	0			
							Total ...	5,37,873	7	3			
							(iv) *Hyderabad*	51,307	13	3			
							(v) *Central Provinces* :—						
							(1) Maintenance of nucleus of pure seed of improved varieties of cotton	3,260	7	6			
							(2) Jarila seed distribution scheme ...	6,229	15	0			
							Total ...	9,490	6	6			
							(vi) *Baroda* :—						
							(1) Navsari Seed Storage	39,023	4	4			
							(2) B. D. 8	17,330	11	9			
							(3) B. 9	9,016	2	8			
							(4) Scheme for creation of pure Wagad Cotton Zone in Mehsana District ...	6,301	4	0			
							(5) Vijaya Scheme	24,841	0	0			
							Total ...	96,572	6	9			
Carried over ...				1,96,22,249	15	6	Carried over ...	16,65,925	12	4	1,16,45,037	6	1

Balance Sheet as on 31st March, 1945—(*Contd.*)

RECEIPTS.			EXPENDITURE.			
Brought forward	1,96,22,249 15 6		Brought forward	16,65,925 12 4	1,16,45,037 6 1	
		(*vii*) Lyallpur Ginnery	16,038 3 3			
		(*viii*) *United Provinces* :—				
		(1) C. 402	18,616 11 6			
		(2) Perso-American Cotton in Western Districts	42,093 6 0			
		Total ...	60,710 1 6		17,42,674 1 1	
		(3) *Marketing Schemes.*				
		(1) Grading and Marking of 1027 A.L.F. in Surat Area	7,414 12 9			
		(2) Punjab Cotton Marketing Survey ...	7,214 1 6			
		(3) Baroda Better Marketing of 1027 A. L. F.	15,733 6 3			
		(4) Extension and Marketing of V. 434 in C. P.	3,64,979 5 4			
		(5) Distribution and Marketing of Buri 107 cotton in Burhanpur Tahsil	24,429 0 0		4,19,770 9 10	
		(4) *Miscellaneous Schemes.*				
		(1) Compilation of Manurial Trials ...	719 15 0			
		(2) Compilation of Handbook dealing with pests and diseases of cotton in the Empire	2,975 5 0			
		(3) Survey of nutritional values in relation to milch buffaloes of fuzzy cotton seed and cotton seed cakes manufactured from such seeds	7,345 5 11			
		(4) Scheme for Research on Chemical finishes	4,000 0 0		15,040 9 11	
Carried over ...	1,96,22,249 15 6	Carried over ...			1,38,22,522 10 11	

Balance Sheet as on 31st March, 1945—(*contd.*)

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE.	Rs. a. p.	Rs. a. p.
Brought forward ...		1,96,22,249 15 6	Brought forward ...		1,38,22,522 10 11
			III. *Technological Research*—		
			1. *Technological laboratory*—		
			A. Capital Expenditure :—		
			(1) Land and Buildings	4,07,988 14 6	
			(2) Machinery	1,23,212 1 2	
			(3) Freight	7,502 2 8	
			(4) Apparatus and Equipment	41,668 5 7	
			(5) Machinery and Workshop	5,789 8 3	
			B. Working Expenses	32,27,265 13 0	
			2. Provincial	2,61,799 1 4	
			3. Development of alternative uses of Indian cotton :—		
			(*a*) Capital Expenditure	29,006 7 9	
			(*b*) Working Expenses	55,386 13 5	
			4. Investigation for improvement in the ginning of Indian cotton :—		
			(*i*) Capital Expenditure	34,072 13 9	
			(*ii*) Working Expenses	21,781 2 0	
					42,15,473 3 5
			IV. *Research Studentships*	2,82,566 1 4	
			Less—Refund from Dr. Taskhir Ahmad ...	3,535 6 0	
					2,79,030 11 4
			By Suspense Account—		
			(1) Committee's Account	3,361 8 2	
			(2) Hoops & Fuel Account :—		
			Total Expenditure ... 31,987 9 0		
			Less—Receipts ... 11,557 2 0		
				20,430 7 0	
			By Balance	12,81,431 6 8	
					13,05,223 5 10
Grand Total ...		1,96,22,249 15 6	Grand Total		1,96,22,249 15 6

INDIAN CENTRAL COTTON COMMITTEE.

PROVIDENT FUND ACCOUNT.

Balance Sheet as on 31st March, 1945.

RECEIPTS.	Rs. a. p.	Rs. a. p.	EXPENDITURE	Rs. a. p.	Rs. a. p.
Subscribers' contributions account	5,28,858 10 4		Advance to subscribers	1,27,427 9 0	
Less—Payments made to subscribers resigned ...	1,93,315 8 11	3,35,543 1 5	*Less*—Recoveries made upto 31st March 1945 ...	1,06,528 2 0	20,899 7 0
Committee's contribution account	5,17,508 3 0		Interest accrued on Government Paper credited for distribution to subscribers upto 31st March 1945		6,101 0 0
Less—Payment made to subscribers resigned and forfeitures for Committee's contributions disallowed.	1,87,296 3 7	3,30,211 15 5			
			By Balance		7,04,366 2 11
Lapse and Forfeiture account		15,844 11 3			
Net interest received on investments		22,601 0 3			
Investment fluctuation account		25,292 2 5			
Suspense receipts—					
Balance due to subscriber (deceased) Mr. N. Sriniwas	500 0 0				
Deposit of Mr. Dutt's own contribution	1,378 11 2	1,878 11 2			
Total ...	.....	7,31,366 9 11	Total ...		7,31,366 9 11

APPENDIX IV

STOCKS OF INDIAN COTTON ON 31st JANUARY, 1945, HELD BY THE MILLS AND THE TRADE IN MADRAS PROVINCE.

(In thousand bales of 400 lbs. each.)

Trade Descriptions of Cotton.	Mill stocks on 31st January					Trade stocks on 31st January					Total stocks on 31st January				
	1941.	1942.	1943.	1944.	1945.	1941.	1942.	1943.	1944.	1945.	1941.	1942.	1943.	1944.	1945.
Tinnevellies	18	27	31	17	37	14	17	15	18	23	32	44	46	35	60
Salems	9	10	20	19	..	2	6	5	4	6	11	16	25	23	6
Cambodias	34	66	99	83	83	21	38	39	49	70	55	104	138	132	153
Northerns & Westerns	23	25	27	15	19	16	10	32	26	13	39	35	59	41	32
Cocanadas	1	4	3	3	1	9	19	5	19	19	10	23	8	22	20
Outside Cottons.. ..	56	61	55	84	66	..	4	1	5	2	56	65	56	89	68
Total ..	141	193	235	221	206	62	94	97	121	133	203	287	332	342	339

APPENDIX V

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS.

(Based on returns made under the Indian Cotton Cess Act, 1923, by mills in British India, and on voluntary returns from mills in Indian States).

Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	†1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.	1944-45.
Bombay Island	664,546	611,606	565,084	491,709	687,287	664,199	636,720	782,815	750,317	634,149	982,084	1,057,745	1,270,766	1,199,172	1,223,679
Ahmedabad	321,503	322,257	348,009	373,345	326,558	320,982	304,398	346,269	346,375	305,459	341,800	414,870	364,999	428,677	401,544
Bombay Province	1,173,659	1,132,645	1,116,297	1,063,549	1,230,616	1,189,310	1,128,744	1,353,998	1,316,313	1,172,285	1,580,079	1,764,339	1,939,423	1,906,606	1,910,619
Madras Province	214,759	200,707	202,013	278,060	312,164	365,423	412,268	422,573	480,839	507,391	525,611	594,054	647,407	596,585	603,796
United Provinces	235,623	256,820	273,573	277,230	292,424	317,011	299,073	288,320	356,331	349,340	381,025	427,305	437,441	414,210	410,596
Central Procinces and Berar ...	118,492	115,018	111,208	112,660	125,014	130,298	122,987	146,587	164,616	142,868	153,825	178,791	174,385	148,020	169,727
Bengal	91,998	102,390	103,784	107,633	101,101	98,892	79,044	92,546	90,611	111,383	135,227	125,740	136,098	138,203	135,697
The Punjab and Delhi ...	73,736	89,681	80,854	71,939	83,897	89,430	93,886	94,742	133,347	165,274	171,652	179,987	182,104	184,950	181,384
Rest of British India	27,101	30,342	31,935	35,139	38,575	38,010	35,823	46,840	49,806	44,867	47,316	64,804	59,003	52,242	52,291
Total—British India	1,935,363	1,987,603	2,009,664	1,946,210	2,183,791	2,228,374	2,172,725	2,445,606	2,591,863	2,493,408	2,994,735	3,335,020	3,575,861	3,440,816	3,464,110
Total—Indian States*	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375	730,970	678,645	694,554
TOTAL-INDIA	2,269,359	2,346,396	2,360,924	2,336,326	2,612,132	2,677,688	2,632,785	2,999,609	3,151,065	3,050,106	3,617,147	4,025,395	4,306,831	4,119,461	4,158,664

*Figures for Indian States for 1930-31, being based on yarn production returns, include foreign cotton also.

†From April 1937, figures for Burma have been excluded.

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES.

(Based on voluntary returns from mills in Indian States.)

N.B.—Figures for 1930-31, being based on yarn production returns, include foreign cotton also.

Cotton Year : 1st September to 31st August.

(In bales of 400 lbs. nett.)

	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.	1944-45.
Hyderabad	28,074	31,290	33,488	33,231	45,588	51,771	49,981	63,093	68,156	67,095	72,860	83,725	83,689	78,204	71,640
Mysore	43,326	40,293	50,596	47,168	51,196	50,824	53,236	55,244	53,858	67,851	65,062	74,966	77,734	57,718	73,088
Baroda	62,578	58,534	50,587	58,612	57,146	51,963	51,761	70,686	73,278	65,573	91,519	90,642	87,542	88,628	81,964
Gwalior	45,207	45,892	43,306	40,362	56,318	72,162	79,079	89,243	94,090	88,688	95,517	94,300	90,025	93,152	87,485
Indore	88,620	95,296	91,086	111,430	114,229	113,379	106,454	147,766	140,792	120,186	168,795	148,867	149,914	144,147	154,429
Kathiawar States	20,288	18,849	18,868	26,506	35,438	37,597	42,717	48,545	44,109	43,703	50,479	60,628	72,857	70,577	71,184
Other Indian States	32,558	39,382	40,209	45,197	45,735	51,462	57,767	57,119	58,444	} 102,702	108,180	137,247	169,209	146,219	154,164
Pondicherry	18,350	20,257	23,170	23,610	22,691	20,855	19,065	22,307	26,475						
Total—Indian States	333,996	358,793	351,260	390,116	428,341	449,314	460,060	554,003	559,202	556,698	622,412	690,375	730,970	678,645	694,554

LOOSE (UNPRESSED) INDIAN RAW COTTON RECEIVED IN MILLS IN BRITISH INDIA.

(Based on voluntary returns furnished by mills.)

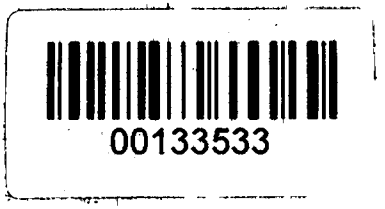
Cotton Year : 1st September to 31st August.

(In Bales of 400 lbs. nett.)

	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.	1935-36.	‡1936-37.	1937-38.	1938-39.	1939-40.	1940-41.	1941-42.	1942-43.	1943-44.	1944-45.
Bombay Province	54,409	74,979	80,092	74,868	58,355	75,617	67,219	74,750	80,164	86,687	96,215	102,965	81,643	54,415	88,072
Madras Province	55,717	99,389	96,340	110,875	123,260	147,044	173,102	156,675	102,489	175,540	189,257	230,691	241,751	202,405	208,800
United Provinces	18,496	14,867	19,236	17,871	10,090	10,405	10,659	15,719	17,532	20,279	29,127	26,293	5,024	4,087	793
Central Provinces and Berar ...	15,771	20,743	17,462	18,382	20,544	27,502	26,321	32,860	26,980	29,052	32,589	31,178	19,153	7,366	3,893
Bengal*	...	...	...	...	...	...	90	...	...	3	...	...	483	5,000	6,017
The Punjab & Delhi†	4,307	2,817	2,149	...	5,535	3,110	28,385	23,873	25,960	33,079	28,627	30,086	22,638	15,319	16,908
Rest of British India*	...	...	...	...	...	...	19,282	17,160	22,916	12,734	15,529	21,280	6,804	4,942	7,441
Total—British India	148,700	211,795	215,279	221,996	217,784	263,678	325,058	321,037	336,041	357,374	391,344	443,395	377,496	293,534	276,404
Indian States*	...	...	...	...	...	...	131,149	109,003	122,078	116,962	131,657	118,660	83,372	78,382	59,809
Total—INDIA*...	...	...	...	...	...	...	456,207	430,040	458,119	474,336	523,001	562,053	460,868	372,416	336,233

*Figures up to 1935-36 not compiled. †Figures up to 1935-36 exclude Delhi

‡From 1936-37 the figures refer to consumption and not receipts and are based on returns furnished under the Indian Cotton Cess Act, 1923, by mills in British India and on voluntary returns from mills in Indian States. From April 1937, figures for Burma have been excluded.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